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REVIEW OF METAL LITERATURE

An Annotated Survey of Articles, Technical Papers and Reports Appearing in Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Prepared at the Center for Documentation and Communication Research, Western Reserve University, Cleveland, Ohio.

Volume 15

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PREFACE

The A.S.M. Review of Metal Literature is a monthly feature of *Metals Review*, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in *Metals Review* from January through December 1958. It is the fifteenth volume in a series that began in 1944.

In most instances, the annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety. In other words, they are indicative rather than informative abstracts.

The table of contents lists the main headings into which the A.S.M. Review of Metal Literature is subdivided, together with secondary subdivisions indicating the scope of the main heading. The main sections are designated by capital letters, and individual annotations are identified by the appropriate capital letter preceded by a serial number.

The method of classifying the annotations into subject subdivisions is based upon the "ASM-SLA Metallurgical Literature Classification, International (Second) Edition," published by the American Society for Metals in 1958. Each annotation is likewise followed by code symbols which refer to the subdivisions and schedules of the ASM-SLA Classification.

An understanding of this coding system, however, is not essential to the use of this volume of the Review of Metal Literature, which is accompanied by a complete subject index starting on page 1189. Since the annotations are classified primarily by processes and properties, the subject index has been prepared with the emphasis primarily on materials. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal industry. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or heat treatment, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of foundry practices, or a particular type of heat treatment, these broad processes will be found indexed and subdivided in the subject index. An author index is also provided and a list of addresses of the journals and periodicals from which the literature references are taken.

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Plant installations; power generation and distribution; materials handling; general service equipment; ore and raw material preparation; fuel distillation and gasification; furnaces and equipment for primary metallurgy; melting and refining furnaces and equipment; casting; ingot and slab preparation; forging; rolling; forming and shaping; machine tools; powder metal processing; heat treating furnaces; other heat treating equipment; welding, brazing and soldering; mechanical assembling; mechanical cleaning and finishing; chemical and electrochemical cleaning and finishing; other cleaning and finishing

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Size, thickness and mass; chemical laboratory; surface properties; thermal properties; electrical properties; nuclear properties; elastic and anelastic properties; mechanical properties; corrosion; radiation detection; optics and microscopy; metallography; photography and other visual aids; sorting and identification; atmosphere and humidity; flaw detection; temperature measurement; electricity; magnetism; pressure; rate, time and flow; computers and business machines; communication

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SECTION A

GENERAL METALLURGICAL

1-A. Scrap Control in Nonferrous Foundries. Martin G. Dietl. *Foundry,* v. 85, Nov. 1957, p. 106-109.
(A8d; EG-a38, RM-n)

2-A. Molybdenum—a Versatile Metal. G. L. Miller. *Industrial Chemist,* v. 33, Oct. 1957, p. 509-518. (CMA)

History, occurrence, ore production, processing, production of different forms, applications, and physical and corrosion resistant properties. The total known molybdenum reserves of the U. S. would last 100 years at the present rate of exploitation. (A general; Mo)

3-A. Science for Electroplaters. Pt. 30. Acidification of Cyanide Waste. L. Serota. *Metal Finishing,* v. 55, Nov. 1957, p. 72-75.

Acid treatment method based on the volatility of hydrogen cyanide when cyanide waste is treated (decomposed) by an acid. (A8d, L17)

4-A. Radiation and Metals. A. E. Williams. *Metal Industry,* v. 91, Oct. 25, 1957, p. 359-362.

Industrial applications of radioisotopes; metal penetration by gamma rays; effects of radiation on solid matter; changes in elastic properties; study of porous metal coatings; thickness gages using isotopes; application to galvanizing wire and vacuum metallizing. 3 ref.
(A general, S general, Q21, 2-67; 14-63)

5-A. (Italian.) **Determination of Foundry Costs.** Eraldo Lotti. *Fonderia Italiana,* v. 6, Sept. 1957, p. 355-360.

Cost analysis method in use for many years in FIAT foundries.
(A4s, E general)

6-A. (Italian.) **Quality Alloy Cast Irons.** Giorgio Giacomelli. *Fonderia Italiana,* v. 6, Sept. 1957, p. 361-366.

Characteristics imparted to cast iron by Ni, Cr, Mo, V, Ti and Cu; methods of making additions; compositions, structures and mechanical properties of high-strength, corrosion, abrasion and heat resistant alloy cast irons. (A general, 2-60; CI, *Ni, Cr, Mo, V, Ti, Cu*)

7-A. (Norwegian.) **Safety and Sanitation in Welding.** *Teknisk Ukeblad,* v. 104, Apr. 4, 1957, p. 268-270.

Hazards and damage possible in different methods of welding; new protective measures.
(A7p, K general)

8-A. Fabrication of Uranium and Its Alloys. E. C. W. Perryman. *Canadian Mining and Metallurgical Bulletin,* v. 50, Sept. 1957, p. 574-579.

Effect of thermal cycling and radiation on dimensional and mechanical properties of U. Casting, rolling, extruding and heat treating U and its alloys. 6 ref. (A general; U)

9-A. Zirconium and Tantalum. G. L. Miller. *Chemical and Process Engineering,* v. 38, Oct. 1957, p. 389-390. (CMA)

(A general, T29, 17-57; Zr, Ta)

10-A. Industrial Hygiene of Metals of Recent Industrial Importance. H. H. Schrenk. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 87A-88A.

Toxicity of boron and boron compounds, Zr, Mo, Ge, Cb, V, Ce, Cs, La, Pr, Nd, Y. Methods of determination of boron in atmosphere and in biological specimens.
(A7; B, Zr, Mo, Ge, Cb, V, Cs, La, Pr, Nd, Y)

11-A. Dust and Fume Control. J. C. Somers. *Mechanical Engineering,* v. 79, Nov. 1957, p. 1022-1024.

(A7, A8a)

12-A. Vacuum Metallurgy. R. C. Bertossa. *Mechanical Engineering,* v. 79, Nov. 1957, p. 1039-1041.

(A general; 1-73)

13-A. Rare Earth Metals. Their Properties and Industrial Application. Felix Trombe. *Metal Treatment and Drop Forging,* v. 24, Oct. 1957, p. 421-424. (CMA)

(A general; EG-g)

14-A. Trends in the Major Non-Ferrous Metals. P. F. Whelan. *Mine and Quarry Engineering,* v. 23, Oct. 1957, p. 440-442.

Brief statistical survey of production of Cu, Pb, Zn and Al over last 50 years. (A4p; Cu, Pb, Zn, Al)

15-A. Past and Future Uranium Utilization. R. L. Doan. *Mining Engineering,* v. 9, Sept. 1957, p. 1009-1112.

(A general, 17-57; U)

16-A. Beryllium. G. L. Miller. *Nuclear Power,* v. 2, Oct. 1957, p. 438-440.

Fabrication, properties and applications. 21 ref. (A general; Be)

17-A. Mag Moves Ahead. *Steel,* v. 141, Nov. 18, 1957, p. 192-203.

Excerpts from papers on casting, extrusion, welding, brazing and pressing presented at the Magnesium Association convention.
(A general; Mg)

18-A. (English.) **Production Problems of Titanium and Its Alloys. Pt. I.** R. L. P. Berry and E. Swainson. *Tidskrift for Kjemi, Bergvesen og Metallurgi,* v. 17, June 1957, p. 87-92. (CMA)

Effects of impurities, transformation, alloying and heat treating on the metallurgy of Ti, methods of reducing Ti, apparatus for melting it. (A general; Ti)

19-A. (German.) **Development of Carbide Techniques in East Germany.** Curt Agt. *Neue Hütte,* v. 2, Sept. 1957, p. 537-544.

Tough, hard and wear resistant carbides; tantalum carbide; titanium carbide; technology, properties, cutting capacity, applications. 15 ref. (A general; Ta, Ti, 6-69)

20-A. (German.) **Heat Resisting and Nonscaling Sintered Materials in Austria.** Friedrich Benesovsky and Richard Kieffer. *Neue Hütte,* v. 2, Sept. 1957, p. 545-554.

Titanium carbide, molybdenum silicide and boride-base materials; Mo and Mo alloys as high-temperature materials. 29 ref.
(A general, 2-12; Mo, 6-69, 6-70)

21-A. (German.) **Organization of Materials and Production in Management.** Werner Schütte, Ulrich Sabass, Hans-Heinrich von Lintig and Anton Schütz. *Stahl und Eisen,* v. 77, Aug. 22, 1957, p. 1146-1160.

(A5)

22-A. (Polish.) **Development of Transformer Steel.** M. Markuszewicz. *Hutnik,* v. 24, July-Aug. 1957, p. 258-266.

Grades of the transformer steel plate; izotropic plates; textured plates; problems of plate utilization; products made in Poland. 56 ref.
(A general; SGA-r, AY)

23-A. (Polish.) **Production and Magnetic Application of Soft Iron-Nickel Alloys in Soviet Union.** W. J. Skotnikow. *Hutnik,* v. 24, July-Aug. 1957, p. 282-289.

Classification of soft magnetic Fe-Ni alloys; technology of production process; uses, trends in Soviet research.
(A general, P16; Fe, Ni, SGA-n)

24-A. (Romanian.) **Recovery of Tellurium From Nonferrous Wastes.** R. Ripan, Gh. Marcu and N. Pascu. *Studii si Cercetari de Chimie,* v. 4, Jan-June 1956, p. 7-11.

Survey of products from the different phases of the Romanian nonferrous industry for recoverable Te. A new method for the preparation of Te by a wet process with acetic acid. (A11d; Te)

25-A. (Russian.) **New Grades of Low-Alloy Steel.** M. V. Pridantsev and G. L. Livshits. *Metallurg,* v. 2, July 1957, p. 18-19.

Chemical composition of 24 grades of low-alloy steel available in U.S.S.R.; advantages over carbon steel. (A general, S22; AY)

26-A. Impact of Automation. *American Machinist,* v. 101, Oct. 21, 1957, p. 166-180.

Reviews extent of automation in metalworking industry.
(A general, 18-74)

27-A. Boron Is a Toxicity Problem. W. H. Schechter. *Chemical and Engineering News,* v. 35, Dec. 2, 1957, p. 54-55.

(A7; B)

28-A.* Materials That Stand up When the Heat's On. J. Wambold and T. F. Frangos. *Design Engineering,* v. 3, Oct. 1957, p. 67-70.

Chemical composition; physical and mechanical properties of some cermets; processes of formation; sintering; densification of shape; applications. (A general; 6-70)

29-A. Cost Accounting Procedures for the Gray Iron Foundry. Pt. 2. Albert E. Grover. *Foundry,* v. 85, Dec. 1957, p. 94-97.

Procedures for handling plant assets. (A5, A4s; CI-n)

30-A. Electric Furnace Fumes Vacuum Cleaned to Prevent Air Pollution. *Industrial Heating,* v. 24, Sept. 1957, p. 1750-1754.

Electric furnace fumes and smoke are trapped by system of dacron bags and automatic dust collectors. (A8a, W17s)

31-A. What to Do About Metal Fires. *Iron Age,* v. 180, Nov. 21, 1957, p. 128-129.

(A7p)

32-A. Treatment and Re-Use of Mill Scale Wastes to Conserve Water and Abate Pollution. Grant A. Pettit. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 144-151.

Facilities and operation for treatment of mill scale wastes from roughing and finishing rolling mills. Sedimentation, flocculation, and clarifications system permits removal of 176,000 to 206,000 lb. of scale a day and recovery of water for reuse in mills and other processes. (A8, W23)

33-A. The Steel Industry in India—Yesterday, Today and Tomorrow. E. T. Warren. *Iron and Steel Engineer,* v. 34, Nov. 1957, p. 80-89.

(A4; ST)

34-A.* High-Boron Alloy Steels. T. H. Middleham, J. R. Rait and E. W. Colbeck. *Iron and Steel Institute, Journal,* v. 187, Sept. 1957, p. 1-14.

Techniques for production of B-Al steels containing up to about 4.75% B which can be forged, rolled or extruded and production of B-Fe alloys with up to 6% B in form of castings; methods of manufacture, physical and mechanical properties, constitution and application of these B steels in thermal nuclear reactors. 23 ref. (A general, D general, Q general; AY, *Al, B*)

35-A. Raw Materials for the American Iron and Steel Industry. James C. O. Harris. *Journal of Metals,* v. 9, Dec. 1957, p. 1529-1532.

Steel consumption; pig iron requirements; iron ore supplies; beneficiated ore; coke requirements; scrap needs; effect of new steelmaking techniques; scrap substitutes. 11 ref.
(A4, D general; ST, Fe, RM-j43, RM-p, RM-n)

36-A. Science for Electroplaters. Pt. 30. Acidification of Cyanide Waste. L. Serota. *Metal Finishing,* v. 55, Nov. 1957, p. 72-75.

(A8b, L17)

37-A.* Research on Titanium. H. D. Kessler. *Metal Industry,* v. 91, Nov. 15, 1957, p. 415-417.

Determination of oxygen by means of the Pt bath vacuum fusion technique; solution treatment; formability and tensile properties.
(A general, S11, J27a, Q23q; Ti)

38-A.* Recent Statistics on Metallurgical Education. Michael B. Bever. *Metal Progress,* v. 72, Nov. 1957, p. 101-106.

While numbers of B.S. degrees in metallurgy do not now reach the postwar peak from G.I. training, the current number (545 in 1955-56) is a higher proportion of all engineering degrees. It is predicted that the figure will reach 750 in the near future and possibly 1000 within a few more years. M.S. degrees have been about 160 in each of the last three years. Ph.D. degrees show a steady increase from 42 in 1948-49, to 76 in 1955-56. (A3)

39-A. Tailings Disposal at Braden Copper Co. R. W. Jigins. *Mining Engineering,* v. 9, *AIME Transactions,* v. 208, Oct. 1957, p. 1135-1140.

Disposal of tailings from copper concentrater in Chile. (A8d; Cu)

40-A. Titanium and Zirconium, Twin Metals of the Atomic Age. K. C. Li. *Mining Engineering,* v. 9, Nov. 1957, p. 1245-1249. (CMA)

History, processing (by the Kroll, iodide, calcium hydride, electrolytic and Gross methods), cost and raw materials of Ti. 3 ref.
(A general, C general; Ti, Zr)

41-A. Metal Selector. *Steel,* v. 141, Oct. 28, 1957, p. 169-178.

Selection of proper metals for jobs considers composition, forming or casting properties, mechanical properties; application of wrought and cast Cu alloys, wrought and cast Al alloys, stainless steels, ferrous casting alloys, Zn die-casting alloys and Ti and Mg alloys. (A general; 17-57)

42-A. Summary of Existing Knowledge on the Zirconium-Uranium Alloys (10 to 50 w/o Uranium). W. L. Mudge, Jr. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-MDM-20, Dec. 8, 1954, 19 p. (CMA)

Properties and fabrication. 23 ref. (A general; Zr. U)

43-A.* Vacuum-Metallurgical Research Gives Industry a Glimpse Into the Future. R. C. Bertossa. *Welding Journal,* v. 36, Nov. 1957, p. 483s-489s.

Applications in designing process equipment for the chemical, petroleum, paper-pulp and aircraft industries. Role of vacuum in casting, purification, degassing, heat treatment, cladding, brazing, melting and joining. 6 ref. (A general, 1-73)

44-A. (Dutch.) **Review of the Behavior of Nickel Alloys, in Particular the Nickel-Chromium Alloys at High Temperature.** C. Vollers. *Metalen,* v. 12, Aug. 31, 1957, p. 302-310. (Pt. 1 in *Metalen,* v. 12, Sept. 15, 1957, p. 342-349.)

Characteristics of heat resistant Ni alloys, particularly Ni-Cr; fatigue, creep tensile properties, deformation, corrosion and weldability. Applications in gas turbines, motors, cast iron molds, extrusion tools, springs, nuts, bolts for high temperature, conveyors in annealing ovens, furnace parts. 19 ref.
(A general, 17-57; SGA-h, Ni, *Cr*)

45-A. (French.) **Present Uses and Possible Applications of Metal Molybdenum.** J. Fabry and P. Gousseland. *Documentation Métallurgique,* no. 27, July-Sept. 1956, p. 223-233. (CMA)

6 ref. (A general, 17-57; Mo)

46-A. (French.) **Influence of Aluminum Content of Zinc Alloys on Their Properties With Respect to Pressure Casting.** L. A. J. Lodder and K. P. Scott. *Fonderie,* no. 139, Aug. 1957, p. 367-377.

Influence of Al on structural, mechanical and chemical properties of Zamak alloys; economic importance; review of previous research. Intergranular corrosion of Zn-Al alloys; steam and atmosphere corrosion tests. 19 ref.
(A general, E13; Zn, *Al*)

47-A. (French.) **Foundry Productivity.** Guy de Ghellinck. *Fonderie Belge,* no. 10, Oct. 1957, p. 247-252.

Comparison of productivity of ten Belgian foundries. (A5, E general)

48-A. (French.) **Calculation of Heat Loss by Conduction in a Cowper.** D. Sanna. *Institut de Recherche de la Sidérurgie,* v. A, no. 129, Oct. 1957, p. 1-16.

(9 ref. (A11e, W17m)

49-A. (French.) **Industrial Grades of Ferronickel and Their Principal Applications.** Jean A. Ternisien. *Métallurgie et la Construction Mécanique,* v. 89, Oct. 1957, p. 817-827.

(To be continued.) (A general, 17-57; Fe, Ni)

50-A. (German.) **Cast Iron With Spheroidal Graphite.** A. Hohmann. *Giesserei Praxis,* v. 75, Oct. 10, 1957, p. 436-437.

Definition; production; properties; advantages. (A general; CI-v)

51-A.* (German.) **Furnace Slag for Road Ballast.** Paul Huttemann. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1436-1442.

Testing methods for strain on road building materials; comparison between natural rock and slag; relationship between chemical composition and mineralogical structure and elastic and plastic properties; determination of crushing degree; effect on properties of different structures. 6 ref. (A11c; RM-q)

52-A. (Italian.) **Iron. Pt. 2. Steel. Pt. 3. Recent Trends in Steelmaking.** Marco Savarese and Andrea Ciaccio. *Industria Mineraria,* v. 8, Aug. 1957, p. 545-560.

Historical review; recent trends in ore preparation and in manufacture of iron and steel; direct production of iron. (To be continued.)
(A2, D general; ST, CI)

53-A. (Norwegian.) **Deposits of Chromium Ore East of Roros.** Rolf Falck-Muus. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 17, no. 5, 1957, p. 73-76.

Mineralogical description. Finds of peridotite minerals (e.g., olivine, enstatite, chromite, uwarowite, magnesite, talcum, and others such as serpentine and asbestos).
(A11a; Cr, RM-n)

54-A. (Book.) **Uranium in South Africa, 1946-1956.** 1029 p. 1957. Associated Scientific and Technical Societies of South Africa, P. O. Box 5907, Johannesburg, South Africa. $20.

(A general; U)

55-A. (Book.) **Making, Shaping, and Treating of Steel.** 732 p. 1957. 7th Edition. United States Steel Corp., Office Service-Stores, 525 William Penn Place, Pittsburgh 30, Pa. $7.50.

Comprehensive summary of present-day theory and practice covering all phases of iron and steel production from raw materials to finished products. (A general; ST)

56-A. (Book.) **First Nuclear Engineering and Science Congress, Selected Papers.** 2 v., 643 p. 1957. Pergamon Press, 122 East 55th St., New York 22, N. Y.

Covers U ores, U alloys and reactor materials. Papers of interest not previously covered as preprints abstracted separately.
(A general, W11p, 17-57; U)

57-A. Materials of Construction: Tin and Its Alloys. Robert M. MacIntosh. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1653-1657.

Recent literature on tin technology and applications. 237 ref.
(A general, 17-57; Sn)

58-A. Materials of Construction: Aluminum Alloys. R. L. Horst. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1578-1583.

Literature review of corrosion, design considerations and fabrication techniques, architectural applications in atomic energy field, in chemical processes, food, marine, packaging, petroleum, power industries, and in pressure vessels. 51 ref.
(A general, 17-57; Al)

59-A. Materials of Construction: Lead and Its Alloys. Edward J. Mullarkey. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1607-1611.

Technology and applications. 90 ref. (A general, 17-57; Pb)

60-A. Materials of Construction: Less Common Metals. E. M. Sherwood. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1612-1617.

Literature review on Zr, Hf, Mo, Cb, Ta, Te, Re and Cr as construction and engineering materials. 143 ref. (A general, 17-57; Zr, Hf, Mo, Cb, Ta, Re, Cr)

61-A. Materials of Construction: Nickel, Including High-Nickel Alloys. R. M. Fuller. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1618-1628.

Review of recent literature on technology and applications. 200 ref. (A general, 17-57; Ni)

62-A. Materials of Construction: Stainless Steels Including Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1643-1652.

Review of recent literature on technology and applications. 137 ref. (A general, 17-57; SS)

63-A. Are We Running Out of Metals. Eric A. Brandes. *Product Engineering,* v. 28, Sept. 1957, p. 36-37.

(A11a, A11b)

64-A. Zirconium Hazards Research. Progress Report No. 1 for Sept. 1, 1956 to Feb. 28, 1957. J. A. Herickes and P. A. Richardson. *U. S. Atomic Energy Commission, AECU-3554,* Feb. 28, 1957, 43 p. (CMA)

(A7p; Zr)

65-A. Stainless Steel and Titanium Sandwich Structures. W. J. Lewis, G. E. Faulkner and P. J. Rieppel. Battelle Memorial Institute, Titanium Metallurgical Laboratory, Report 79. *U. S. Office of Technical Services,* PB 121633, Aug. 1957, 29 p. (CMA)

(A general; Ti, SS, 7-59)

66-A. (French.) **Gallium, Metal of the Future.** *L'Industrie Chimique,* no. 482, Sept. 1957, p. 278.

(A general; Ga)

67-A. (French.) **Germanium, Industrial Metal.** P. B. deCleene. *L'Onde Electrique,* v. 37, Aug-Sept. 1957, p. 701-722.

Sources; production of germanium oxide; extraction and refining; zone refining; use of Ge in electrical and electronic fields. 9 ref.
(A general; Ge)

68-A. (German.) **Pyrophoric Alloys.** H. Nowotny and O. Smetana. *Osterreichische Chemiker-Zeitung,* v. 58, Aug-Sept. 1957, p. 195-208.

Cerium, Mn-Sb alloys and other spark producing metals. 77 ref.
(A general; Ce, Mn, Sb)

69-A. (German.) **Use of Common Construction Steel.** W. Kuntscher. *Technik,* v. 12, Aug. 1957, p. 555-559.

Application and advantages of rimmed steel.
(A general, 17-57; ST-d)

70-A. (Italian.) **Air Pollution and Purification in a Foundry.** Antonio Riggi. *Fonderia Italiana,* v. 6, Oct. 1957, p. 381-392.

Elaborate installation for control of atmospheric dust and fumes in Fiat foundries in Turin. 21 ref. (A8a, E general)

71-A. (Italian.) **Ancient Tuscan Metallurgy. The Follonica Iron Works and the Medici.** Bruno Boni. *Fonderie Italiana.* v. 6, Oct. 1957, p. 393-400.

Study of early 19th century objets d'art. History of Tuscan metallurgy and ties of Medici family to this foundry. (To be continued.) (A2; CI)

72-A. (Portuguese.) **Expansion of Steel Manufacture in State of Sao Paulo.** Roberto Nami Jafet. *ABM, Associacao Brasileira de Metais, Boletim,* v. 13, July 1957, p. 171-193.

Survey of steelmaking from 1590 to date. Production, consumption, raw materials, labor supply, equipment, financing, electrical energy, transport, as related to recent past and presentday scene. (A2; ST)

73-A. (Portuguese.) **The Scientific Revolution and the Metals and Alloys of the Future.** Luiz Coelho Correa da Silva. *ABM, Associacao Brasileira de Metais, Boletim,* v. 13, July 1957, p. 195-214.

Metals and alloys viewed in light of progress in metallurgy since 1945; possible lines of future progress. Emphasis on contributions from field of atomic science. (A9)

74-A. (Russian.) **Hard Metals for Metal Cutting Tools.** V. Ya. Rassokhin and M. A. Rura. *Stanki i Instrument,* v. 28, June 1957, p. 19-22.

Standard hard metals consist either of W carbide or various combinations of W, Ti, Cb, and Ta carbides. The bonding material in each case is Co. Tables of manufacturers, composition and physical properties of commercial hard metals. 7 ref. (A general, 6-69)

75-A. Cost Accounting Procedures for the Gray Iron Foundry. Pt. 3. Albert E. Grover. *Foundry,* v. 86, Jan. 1958, p. 103-107.

(A4s; CI-n)

76-A.* Treatment of Water-Borne Wastes From Steel Plants. Ross Nebolsine. *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 125-151.

Flue dust, mill scale and oils, soluble oils, waste pickle liquor, phenols, granulated cinder, treatment costs. (A8, D general; ST)

77-A. Science for Electroplaters. Pt. 31. Cyanide Waste Treatment—Chlorination. L. Serota. *Metal Finishing,* v. 55, Dec. 1957, p. 77-80.

(A8b)

78-A.* Metals for Space Travel. F. L. LaQue. *Steel Processing and Conversion,* v. 43, Dec. 1957, p. 691-694, 709-710.

Materials discussed are Mg alloy HK 31; Al 2024; **stainless steel 17-7 PH; Inconel "X"; hardenable Invar; Ti, Mo.**

(A general, T24e, 17-57; SGA-h)

79-A. Zirconium, Titanium, and Hafnium for an Atomic Age Market in an Important Chemical and Metals Complex. William Greenleaf. Paper from "Conference on Atomic Energy in Industry", v. 5, p. 147-149. (CMA)

(A general; Zr, Ti, Hf)

80-A. Beryllium. Wallace W. Beaver. Paper from "Conference on Atomic Energy in Industry," v. 5, p. 149-152.

Properties, uses in nuclear reactions and mining processes. (A general, T11, 17-57; Be)

81-A. Thorium. Howard E. Kremers. Paper from "Conference on Atomic Energy in Industry", v. 5, p. 149-152.

Use in reactors, possible future uses. Increased production presents problem of disposing of surplus rare earths produced as byproducts. 4 ref. (A general, T11, 17-57; Th)

82-A. Use of Refractory Metals and New Ceramics. Bernard Kopelman. Paper from "Conference on Atomic Energy in Industry", v. 5, 1957, p. 154-160.

Molybdenum, columbium, vanadium, silicon carbide, beryllium oxide, magnesium oxide. (A general; Mo, Cb, V, EG-g, 6-70)

83-A. (English.) **Data on the History of Metallurgy in Hungary. Pt. 5.** A. Schleicher. *Acta Technica,* v. 18, no. 3-4, 1957, p. 427-431.

Manufacture of pig iron from high-alumina ores in the 18th century. 5 ref. (A2, D1; CI-a)

84-A. The Case for Titanium. *Light Metal Age,* v. 15, Dec. 1957, p. 15.

(A general, 17-57; Ti)

85-A. Condensed Review of Some Recently Developed Materials. *Machinery,* v. 64, Oct. 1957, p. 165-180.

Properties and applications of alloys, adhesives and other materials. (A general, Q general, 17-57)

86-A.* Science for Electroplaters. Pt. 32. Cyanide Waste Treatment—Hypochlorites. L. Serota. *Metal Finishing,* v. 56, Jan. 1958, p. 61-64, 67.

Oxidation of cyanides by hypochlorites proceeds, as with chlorine gas in two stages; with conversion of cyanide to cyanate first, followed by complete decomposition yielding carbon dioxide and nitrogen as the end products. (A8b, L17)

87-A. U. S. Navy Aircraft Fire Fighting and Rescue Manual. Bureau of Aeronautics. *U. S. Office of Technical Services,* PB 121332, Jan. 1956, 241 p. $6.25.

(A7p)

88-A. Use of Trimethoxyboroxine for the Extinguishment of Metal Fires. Pt. 1. Magnesium. R. L. Tuve, R. L. Gipe, H. B. Peterson and R. R. Neill. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 121986, July 1957, 47 p. $1.25.

(A7p; Mg)

89-A. Rare Earths and Thorium. Richard L. Stone. *Baltimore Engineer,* v. 32, Oct. 1957, p. 4-8.

History, sources, development, present applications and possible future uses of Th, Ce, and rare earth elements.
(A general; 17-57, Th, EG-g)

90-A. Iron Industry of the Weald. Frederick Evans. *Iron and Steel,* v. 30, Oct. 1957, p. 469-471.

Brief history of ironmaking in the Weald region of England from Roman times onward, with special emphasis on the 15th, 16th, 17th and 18th centuries. (A2; CI, ST)

91-A. Dust Problems of the Iron and Steel Industry. M. W. Thring and R. J. Sarjant. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 571-573.

Fume and dust content and gas volume for openhearth, arc, cupola, blast and reheating furnaces and Bessemer converter. Methods of dust control presently employed and those under test. (A8a; ST)

92-A. Application and Working of Honeycomb Core. Pt. 1. W. A. Nordhoff. *Western Machinery and Steel World,* v. 48, Oct. 1957, p. 87-91.

Features of honeycomb materials and properties of aluminum and stainless steel honeycomb; holding and machining methods. (To be concluded.)
(A general, T24a; 17-59, Al, SS,)

93-A. (Italian.) **Outlines of Future Scientific Activity of the Instituto Sperimentale dei Metalli Leggeri.** C. Panseri. *Alluminio,* v. 26, Oct. 1957, p. 413-421.

Current and projected research includes study of vacancies in pure Al, internal friction, fatigue strength of metals in general, of light alloys in particular; study of homogenization of alloys via color metallography; metallographic study of radioactive materials; quantitative determination of preferred crystal orientations of high-strength extrusions and rolled products; corrosion and corrosion prevention. (A9h; EG-a 39)

94-A. (Russian.) **Achievements of Soviet Metallurgy.** *Metallovedenie i Obrabotka Metallov,* no. 11, Nov. 1957, p. 2-17.

(A general)

95-A. (Russian.) **Scientific Achievements in Field of Metals and Machine Building.** I. R. Kryanin. *Metallovedenie i Obrabotka Metallov,* no. 11, Nov. 1957, p. 56-65.

(A general)

96-A. (Pamphlet.) **Materials Survey—Tungsten.** U. S. Business and Defense Service Administration. 100 p. Dec. 1956. U. S. Government Printing Office, Washington 25, D. C. $.75.

Technical and economic status in relation to material requirements.
(A general; W)

97-A. Methods of Combatting Air Pollution in Ferrous and Non-Ferrous Foundries. Herbert J. Weber. *Air Pollution Control, Journal,* v. 7, Nov. 1957, p. 178-181.

(A8a)

98-A. A History Lesson on Nineteenth Century Metallurgical Industry. R. Chadwick. *Birmingham Metallurgical Society, Journal,* v. 37, Dec. 1957, p. 566-595.

(A2)

99-A. Republic Steel Corporation Expands Cleveland Plant to 3,360,000 Tons Capacity. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 60-62.

By addition of two new 375-ton openhearth steelmaking furnaces and expansion of four other openhearths. (A4p, D2; ST)

100-A. Automotive Gray Cast Iron. Pt. 2. D. L. Watson. *Canadian Metalworking,* v. 20, Dec. 1957, p. 42-46.

Rate of transformation and ideal composition.
(A general, T21, 2-60; CI)

101-A. Liquid Metals Technology. Pt. 1. *Chemical Engineering Progress Symposium Series,* v. 53, no. 20, 1957, 84 p. (Published by American Institute of Chemical Engineers.)

Articles abstracted separately.
(A general, 14-60)

102-A.* Manufacture and Availability of the Alkali Metals. Marshall Sittig. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 35-41.

Review of manufacturing processes for various alkaline metals and brief historical notes. Raw materials situation with regard to geographic location, ore processing, present manufacturing facilities in various countries of the world; future possibilities. 25 ref.
(A11a, A general; EG-e, 14-60)

103-A. A Century and a Half of Sodium Development. M. Schofield. *Chemical Products and Chemical News,* v. 20, Dec. 1957, p. 503-504.

Isolation of Na in 1807; development of manufacture; some current uses. (A general; Na)

104-A.* Developments in the Iron and Steel Industry During 1957. I. E. Madsen. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 139-185; 188-189.

Detailed analysis of production statistics; future trends, announced expansion plans for both American and foreign plants; raw materials; survey of new blast furnace, steelmaking, rolling and finishing techniques; furnaces and methods of control; mechanical and electrical innovations. (A4, D general, F23; ST)

105-A. Republic's Expansion Program Nears Completion. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 196-199.

Program will increase the annual ingot capacity of the Cleveland plant by 788,000 tons to 3,360,000 tons.
(A4p, D general; ST)

106-A. Fundamentals of Scale Model Experiments. W. O. Philbrook. *Journal of Metals,* v. 9, Oct. 1957, p. 1353-1358.

Problems and limitations in modeling and results obtainable from pilot-plant studies of complex metallurgical processes with application to heat transfer of solid patricles, fluid flow models, gasification of fuels, shaft, reverberatory and arc furnaces. 12 ref.
(A9j, A11e, D general)

107-A.* Design of Pyrometallurgical Pilot Plant. R. C. Buehl. *Journal of Metals,* v. 9, Oct. 1957, p. 1359-1362.

Design of scale pilot plants for study of entire processes. Pilot plant of electric arc, melting furnaces, blast furnaces, openhearth furnaces and converters are considered. (A9j, W17, W18, D general)

108-A. European Metallurgical Research—Fundamental to the Coal and Steel Community. F. Weston Starratt. *Journal of Metals,* v. 9, Oct. 1957, p. 1365-1366.

Report on metallurgical research program supported by authority of European Coal and Steel Community. (A9; ST)

109-A. Blast Furnace U. S. A. Pt. 3. From Falling Creek to Zug Island. M. O. Holowaty and C. M. Squarcy. *Journal of Metals,* v. 9, Oct. 1957, p. 1367-1372.

Historical account of conversion of furnaces from charcoal to bituminous and finally to coke. The expansion of the American iron and steel industry during the 19th and 20th centuries; evolution in furnace dimensions. 38 ref. (A2, D1)

110-A. "Araldite" and the Light Metals. P. A. Dunn. *Light Metals,* v. 20, Dec. 1957, p. 389-394.

Various applications of epoxy resins for coatings, adhesive and filler on light metals. Epoxy resin also used for tooling material.
(A general, K12, L26p, 17-57; NM-d)

111-A. French Aluminum Industry. Georges A. Baudart. *Metal Progress,* v. 73, Jan. 1958, p. 72-75.

The lead taken by France's pioneering scientists in Al technology has been maintained by their successors. Recent changes in cell design and operations have decreased power requirements by 27%, and man-hours by 66%.
(A4p, C23, F23; Al)

112-A. Progress of Metallurgy in Europe. Hubert Sutton. *Metal Progress,* v. 73, Jan. 1958, p. 102-104.

Metallurgical education in England is steadily expanding, although free and rapid interchange of information leaves something to be desired. Pressing problems in Europe as in America have to do with brittle behavior of metals, resistance to hot corrosive surroundings and damage by thermal or stress cycling.
(A9, A3)

113-A. Iron and Steel Needs of Argentina. Juan B. De Nardo. *Metal Progress,* v. 73, Jan. 1958, p. 109-111.

In the late 1920's Argentina produced only 10% of its needed iron and steel; now it makes 30%. Future deficits will be reduced when the San Nicolas steel mill starts production. Annual needs for 1,200,000 metric tons are predicted during the 1960 decade.
(A4p, D general; ST)

114-A. Heat Resistant Alloys. *Metalworking,* v. 8, Oct. 1957, p. 107-109.

Tabular data on heat resistant alloys giving typical composition and heat treating recommendations for a wide variety of stainless steels, Ni-base, Cr-base and Co-base alloys.
(A general, J general; SGA-h)

115-A. Putting Honeycomb Scrap to Work. Jack Lewis. *Tool Engineer,* v. 34, Dec. 1957, p. 91-92.
(A11d; Al, 7-59, RM-p)

116-A. Engineering Properties of Pattern Waxes. Charles J. Marsel, Leonard Kramer and Alexander Saunders. *Tool Engineer,* v. 39, Nov. 1957, p. 95-98.

Tests performed on six commercial waxes relating temperature to volume change, hardness and viscosity; tensile strength and cooling; curves tabulated.

(A general, E15; NM-d32)

117-A. Titanium, a Materials Survey. Jesse A. Miller. *U. S. Bureau of Mines, Introduction Circular* 7791, Sept. 1957, 202 p.

Titanium and rutile as strategic materials. (A general, A11; Ti)

118-A. Stainless Steel and Titanium Sandwich Structures. W. J. Lewis, G. E. Faulkner and P. J. Rieppel. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121633, Aug. 1957, 39 p. $1.

Summary of published literature and government research reports.
(A general, T24a, 7-59; Al, SS)

119-A. (Finnish.) **Recent Developments of the Steel Industry at Home and Abroad.** L. Pietikainen. *Teknillisen Kemian Aikakauslehti,* v. 14, June 1957, p. 213-215.

Mechanical properties of mass production steel and the international quality requirements; new methods and the use of automation; estimates for the future; progress in the Finnish steel industry.
(A general; ST)

120-A. (French.) **French-English and English-French Glossary of Machine Tool Terms.** Pierre Nichil. *La Machine Moderne,* v. 51, Nov. 1957, p. 95-96.

(A general, G17; 11-67)

121-A. (German and French.) **History of Arc-Welding Electrodes.** F. Wortmann. *Zeitschrift für Schweisstechnik,* v. 47, Oct. 1957, p. 242-247.

Carbon electrodes, metallic electrodes and automatic welding; use of fluxes, lime and coated electrodes. (A2, W29h)

122-A. (German.) **Hard Metals.** C. Agte and R. Kohlermann. *Die Technik,* v. 12, Oct. 1957, p. 686-689.

New materials and carbides suitable for finishing steel. 9 ref.
(A general, T6n; SGA-j; Ti, W, 6-69)

123-A. (German.) **Forecasting of Production and Profit in Foundries.** Walter Fuhrman. *Giessereitechnik,* v. 3, Oct. 1957, p. 225-228.

(A5, E general)

124-A. (German.) **Ceramics for High Temperatures.** Walter Richter. *Silikat-Technik,* v. 8, Sept. 1957, p. 387-389.

Tests on alumina-chromium and alumina-molybdenum cermets. 5 ref.
(A general, 6-70; SGA-h)

125-A. (German.) **Réaumur and Discovery of Malleable Iron.** H. Abrecht. *Schweizerische Bauzeitung,* v. 75, Oct. 12, 1957, p. 651-653.
(A2, E general; CI-s)

126-A. (German.) **New Materials and Testing Services. Metallic Materials.** Karl Wellinger. *VDI Zeitschrift,* v. 99, Sept. 21, 1957, p. 1343-1346.

Survey of recent technological developments. 92 ref. (A general)

127-A. (Italian.) **Ancient Tuscan Metallurgy: The Follonica Foundry and the Lorena Family.** Bruno Boni. *Fonderia Italiana,* v. 6, Nov. 1957, p. 421-430.

Installations, products, economic role, 1737-1845, under Lorena family, who replaced Medicis in Grand Duchy of Tuscany. 10 ref. (A2)

128-A. (Russian.) **Production of Steel in the U. S. S. R.** D. A. Smolyarenko. *Stal',* v. 17, Nov. 1957, p. 968-976.
(A4; ST)

129-A. (Russian.) **Research in the Field of New Steels, Alloys, Metallography and Heat Treatment.** M. V. Pridantsev. *Stal',* v. 17, Nov. 1957, p. 1006-1010.

Progress made in developing new steels and alloys to meet the growing demands of the Soviet industry.
(A9, M general, J general; ST)

130-A. (Russian.) **Development of the Iron and Steel Industry of Hungary.** Gertzeg Ferentz. *Stal',* v. 17, Nov. 1957, p. 1032-1033.
(A general; ST)

131-A. (Russian.) **Development of the Metallurgical Industry in East Germany.** Rudolf Shtainband. *Stal',* v. 17, Nov. 1957, p. 1034-1038.
(A general)

132-A. (Russian.) **Iron and Steel Industry in Poland.** K. Zhemaitis. *Stal',* v. 17, Nov. 1957, p. 1038-1041.
(A general; ST)

133-A. (Russian.) **Development of the Metallurgical Industry in Roumania.** Karel Lonchar. *Stal',* v. 17, Nov. 1957, p. 1042-1045.
(A general)

134-A. (Russian.) **Condition and Perspective of Development in the Iron and Steel Industry of Czechoslovakia.** Vatslav Cherny. *Stal',* v. 17, Nov. 1957, p. 1046-55.
(A general; ST)

135-A. (Czech.) **Control and Regulation of Metallurgical Production Quality.** Jaroslav Brynda. *Hutnické Listy,* v. 12, Nov. 1957, p. 1045-1049.

Improvement in Czechoslovakian metallurgy requires better final products inspection, better production processes and equipment and metallurgical - mathematical statistical analytical methods to uncover causes of defects. 7 ref.
(A5, S general)

136-A. (German.) **Investigation on an Iron Short Sword of Luristanic Origin.** Friedrich Karl Naumann. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 575-581.
(A2; Fe)

137-A. (German.) **The Age of Iron Production on the Banks of the Lower Sieg.** Josef Wilhelm Gilles. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1883-1884.
(A2; Fe)

138-A. (French.) **100th Anniversary of Cowper Stoves.** Louis Delville. *Metaux, Corrosion, Industries,* v. 32, Oct. 1957, p. 397-405.

Evolution of recuperators in general; role of Cowper stoves in development of steel manufacture. 6 ref. (A2, W17m; ST)

139-A. (French.) **Production of Aluminum in the Countries of Eastern Europe.** G. A. Baudart. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1187-1189.

Before last war, the only East European countries producing Al were Russia and Hungary. Czechoslovakia now has plant which produced 24,000 tons in 1955, and expects to increase capacity to 56,000 tons by 1960. Poland, Roumania, and Bulgaria have also entered field. (A4p; Al)

140-A. Research and the Nickel Industry. R. D. Parker. *Canadian Mining and Metallurgical Bulletin,* v. 50, Nov. 1957, p. 659-664. (Also *Transactions,* v. 60, 1957, p. 357-362.)
(A2, A9m; Ni)

141-A. Cost Accounting Procedures for the Gray Iron Foundry. Albert E. Grover. *Foundry,* v. 86, Feb. 1957, p. 89-91.
(A4s, E general; CI-n)

142-A. Metallurgical Summary of 1957. W. H. Eisenman. *Industrial Heating,* v. 25, Jan. 1958, p. 40-42.

Search for metals with increased strength, corrosion resistance and superior qualities at 1200 to 2000° F.; development of alloys for specific purposes; production of such metals as Cb, Ta and Zr in ductile form for nuclear applications; research in direct reduction of iron; usable foamed Al; new techniques in powder metallurgy; new information about Pu. (A general; 10-54)

143-A. Titanium-Sheet-Rolling Program. N. E. Promisel and William J. Harris, Jr. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1112-1115.

Program has as its objectives the development of production techniques for producing necessary reliability, strength and high-temperature characteristics and to obtain design and manufacturing data for new Ti sheet alloys.
(A general, F23q; Ti, 4-53)

144-A. Science for Electroplaters. Pt. 33. Cyanide Waste Treatment—Ozonation and Electrolysis. L. Serota. *Metal Finishing,* v. 56, Feb. 1958, p. 71-74.
(A8b, L17)

145-A. Wrought Titanium. J. R. Crane. *Metal Industry,* v. 91, Nov. 29, 1957, p. 445-458, 464.
(A general, 4-53; Ti)

146-A. Metallurgical Research and Education. (Continued.) G. P. Chatterjee. *Science and Engineering,* v. 10, Sept. 1957, p. 41-56.

Ionic theory of slag; ionic nature of molten alloys; development of new alloys; establishment of alloy steel and ferro-alloy plants in India; surface phenomena and diffusion; imperfections in crystals, dislocations; stress and strain in metals and alloys; nuclear metallurgy; funda-

mentals of metallurgical and engineering education. 85 ref. (A9, A3)

147-A. Ferrous Castings Stretch Your Dollars. *Steel,* v. 142, Jan. 13, 1958, p. 70-74.

Mechanical properties and advantageous factors governing proper selection of various irons. New uses stimulated by advanced metallurgy. (A general, Q general, 17-57; CI)

148-A.* Tantalum. F. G. Cox. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 416-422.

Physical, mechanical and corrosion resistant properties; rolling, drawing, spinning, machining and welding characteristics. (A general; Ta)

149-A. (French.) **American Research on Boron Steels.** A. Roos. *Metallurgie et la Construction Mecanique,* v. 89, Dec. 1957, p. 1015-1019.

(A9; ST, *B*)

150-A. (Norwegian.) **Place of Norway in the Aluminum Industry of the World.** Aage W. Owe. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 17, no. 8, 1957, p. 121-124.

Development of the Norwegian Al industry. Further investments are recommended on the basis of increasing demands and on the favorable position of Norway due to cheap electric power. (A4; Al)

151-A. (Russian.) **Foundry Production in Leningrad.** N. G. Girshovich and Yu. A. Nekhandzi. *Liteinoe Proizvodstvo,* Oct. 1957, p. 6-13.

Historical survey of production of cast iron, steel and nonferrous castings in Leningrad in past 40 years. (A2, E general)

152-A. (Pamphlet.) **Materials Survey—Aluminum. Business and Defense Services Administration.** 100 p. Nov. 1956. U. S. Government Printing Office. Washington 25, D. C. $2.50.

Aluminum and the Al industry in national defense.
(A general, 17-57; Al)

153-A. Place of the Iron and Steel Industry in the Australian Economy. I. M. McLennan. *Australasian Institute of Mining and Metallurgy, Proceedings,* no. 183, Sept. 1957, p. 1-16.

(A general, A4, ST)

154-A. Metallurgical Engineering and Atomic Energy. R. Carson Dalzell. *Journal of Engineering Education,* v. 48, Dec. 1957, p. 188-192.

Role of metallurgy and ceramics in atomic energy; educational programs for engineers initiated by A.E.C. (A3, T11, W11p)

155-A.* U. S. Progress in Titanium During 1957. W. J. Harris, Jr. *Journal of Metals,* v. 10, Jan. 1958, p. 19-20.

Sponge capacity; continuous cold strip rolling; heat treating techniques; new alloys; temperature and weldability limitations; costs; future outlook. (A general; Ti)

156-A.* Titanium in Britain and the Continent. Eric Swainson. *Journal of Metals,* v. 10, Jan. 1958, p. 21-24.

Titanium sponge, ingot and fabricated forms are now produced commercially in France, Western Germany and Britain. In addition, pilot plants have been operated in Sweden, Italy and Austria, and commercial production may have started. Description of sodium reduction process developed in England by Imperial Chemical Industries Ltd. (A4p, C19; Ti)

157-A. Soviet Titanium Research and Production. John P. Nielsen. *Journal of Metals,* v. 10, Jan. 1958, p. 25-26.

Russian progress as observed in a visit to the USSR. (A4p, A9; Ti)

158-A. Aluminum and France. F. Weston Starratt. *Journal of Metals,* v. 10, Jan. 1958, p. 38-43.

Bauxite mines, alumina plants and Al reduction works of Pechiney, France's leader in Al.
(A4, A11a, C general; Al)

159-A. Thirty Years in American Metallurgy. John J. B. Rutherford. *Metal Progress,* v. 73, Feb. 1958, p. 106-111.

In retrospect, the state of metallurgical art, science and industry existing in 1926 (when Sauveur gave a "modern" definition of the microconstituents in steel) appears rather elementary in many fields—metallography, materials, manufacturing methods, control.
(A2, M general)

160-A. Alloys for Making Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Machinery Market,* no. 2980, Dec. 28, 1957, p. 24-26.

Development of superalloys for service up to 800° C. and higher. These are of four general types: (1) primary ferrous alloys containing substantial amounts of Ni and Cr, (2) alloys whose major constituents are Cr, Ni and Co, (3) Ni-base alloys, (4) Co-base alloys. (A general, 5; SGA-h, Ni, Cr, Co)

161-A. Salaries of Metallurgists. Walter Morrison. *Metal Progress,* v. 73, Feb. 1958, p. 93-96.

A survey of all members classed as metallurgists or metallurgical engineers shows that, on the average, starting salaries measured in present-day purchasing power have steadily increased since the depression years, and as much as 45% since 1949. Their salaries are considerably higher than those of the 108,000 engineers surveyed in 1956 by Engineers Joint Council. (A6q)

162-A.* (French.) **Commercial Grades of Ferronickel and Their Principal Applications. Pt. 2.** Jean A. Ternisien. *Metallurgie et la Construction Mécanique,* v. 89, Nov. 1957, p. 917-925.

Composition and properties, mechanical, magnetic and electrical, and commercial designations of 46 American and European alloys; applications of many, particularly in electrical and electronic equipment. 31 ref.
(A general, T1, 17-57; Fe, Ni, SGA-n)

163-A. (German.) **Properties and Manufacture of WC-Co Alloys.** W. J. Tretjakow. *Die Technik,* v. 12, Nov. 1957, p. 733-735.

8 ref. (A-general, Q-general; W, Co, 6-70)

164-A. (German.) **Geochemical Aspects of Rare Metals; Importance in Modern Technology.** H. Reh and H. J. Rosler. *Die Technik,* v. 12, Nov. 1957, p. 741-745.

Resources of Rb, Cs, Be, Ce, Ti, Hf, Th, V, Re, Pt, Ga, In, Tl, Ge, Se and Te. (A11a; RM-n)

165-A. (German.) **Titanium and Titanium Alloys.** U. Zwicker. *Die Technik,* v. 12, Dec. 1957, p. 815-818.
(A-general; Ti)

166-A. (Hungarian.) **History of Hungarian Art-Founding.** Laszlo Jakoby. *Kohaszati Lapok (Ontöde),* v. 12, June 1957, p. 135-138.
(A2, E general, T9q)

167-A. Metallurgical Development and Atomic Energy. John Cockcroft. *Atomics and Nuclear Energy,* v. 9, Jan. 1958, p. 5-6.
(A-general, T11, W11p)

168-A. Metallurgical Research. W. E. Dennis. *Atomics and Nuclear Energy,* v. 9, Jan. 1958, p. 7-9.
(A9m, T11)

169-A. Chromium. Technical Properties and Modern Uses. L. Sanderson. *Canadian Mining Journal,* v. 79, Jan. 1958, p. 78-79.
(A-general, Q-general, 17-57; Cr)

170-A. Titanium's Success Story. Roy J. Lamm. *Cornell Engineer,* v. 23, Jan. 1958, p. 28-30.
(A-general; Ti)

171-A. Redesigning With Gray Iron Castings. *Design Engineering,* v. 4, Feb. 1958, p. 31-32, 81.
(A-general, 17-57, 17-51; CI-n)

172-A. Planning and Operating Industrial Waste Plant in Plating Facility. G. J. O'Kane. *Engineering Journal,* v. 5, Jan-Feb-Mar. 1958, p. 8-11.
(A8b, L17)

173-A. New Techniques in Vacuum Metallurgy. Paul J. Halyard, Jr. *Florida Engineer,* v. 8, Jan. 1958, p. 29, 42.
(A-general, 1-73)

174-A. How Foundries Are Training Engineers. Jack C. Miske. *Foundry,* v. 86, Mar. 1958, p. 76-79.
(A3h, E-general)

175-A. What You Need for a Minimum Metallurgical Laboratory. Joseph R. Driear. *Foundry,* v. 86, Mar. 1958, p. 83.
(A9h, 1-53)

176-A.* How to Select a Resistance Heating Alloy. Robert J. Fabian. *Materials in Design Engineering,* v. 47, Feb. 1958, p. 104-108.

Heating alloys can be classified into four principal groups; Ni-Cr, Ni-Cr-Fe, Fe-Cr-Al-Co (some of the newer alloys in this group do not contain Co), and molybdenum disilicide. Properties, costs and uses.
(A-general, Q-general, 17-53, 17-57; SGA-q)

177-A.* Aluminium and Its Alloys in 1957. E. Elliott. *Metallurgia,* v. 57, Feb. 1958, p. 79-92.

Comprehensive review of literature of extraction, founding, fabrication, constitution, properties and standardization. 216 ref.
(A-general; Al; 10-54)

178-A. Recovery Tests on "Mint Sweep" From the Royal Mint, Perth, Western Australia. *School of Mines of Western Australia, Report 687,* May 27, 1957, 12 p.

Results of 14 experiments in recovery of Au and Ag from residual material at the Royal Mint, Perth.
(A11d; Au, Ag)

179-A. Gold. J. P. Ryan and Kathleen M. McBreen. *U. S. Bureau of Mines Minerals Yearbook,* 1955, 22 p.

Production methods, monetary stock, foreign trade in U. S. and abroad. 5 ref. (A-general; Au)

180-A. Thorium. John E. Crawford. *U. S. Bureau of Mines Minerals Yearbook,* 1955, 8 p.

General review of production, uses and prices in U. S. and abroad. Use as source of fissionable material for nuclear-powered generating systems and for fabrication of guided missiles and jet aircraft; engine components. 26 ref.
(A-general, T11g, T24, 17-57; Th)

181-A. Titanium. Jesse A. Miller. *U. S. Bureau of Mines Minerals Yearbook,* 1955, 23 p.
Production, uses and prices in U. S. and abroad. 50 ref.
(A-general; Ti)

182-A. Tin-Bearing Placer Deposits Near Tofty, Hot Springs District, Central Alaska. Bruce I. Thomas. *U. S. Bureau of Mines, Report of Investigations 5373,* Dec. 1957, 56 p.
(A11a; Sn)

183-A. Metallurgy in the Public Service. Julius J. Harwood. *U. S. Office of Naval Research, Research Reviews,* Jan. 1958, p. 14-19.
(A9m)

184-A. (German.) **Application of Rare Metals in Modern Technology.** W. Schreiter. *Die Technik,* v. 12, Dec. 1957, p. 806-814.
Properties and technical applications of Cs, Ga, In, Tl, Ge, Te, Hf, Th, Re, Pt, Os, Pd, Rh and Ru.
(A-general; EG-b, EG-c, EG-e)

185-A. (Hungarian.) **History of Hungarian Art. Founding.** Laszlo Jakoby. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 90-97.
(To be continued.) (A2, E-general, T9)

186-A. (Hungarian.) **Educational System for Metallurgical Engineers in Moscow.** Jozsef Verö. *Kohaszati Lapok,* v. 12, Mar. 1957, p. 97-105.
(A3g)

187-A. (Hungarian.) **Survey of World Aluminum Situation.** Andras Domony. *Kohaszati Lapok,* v. 12, Mar. 1957, p. 130-139.
(A4; Al)

188-A. (Hungarian.) **Aluminium Industry of Japan.** Tihamer Gedeon. *Kohaszati Lapok,* v. 12, Mar. 1957, p. 139-142.
(A-general; Al)

189-A. (Hungarian.) **Improvement of Structural Steels by Alloying With Tungsten.** Lorant Sas. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 163-169.
(A-general, M27, Q-general; AY, W)

190-A. (Russian.) **Metals and Semiconductors of High Purity.** N. N. Muroch. *Priroda,* Dec. 1957, p. 21-26.
Further advances in fields of electronics, radio engineering and heat resistant metals require metals and semiconductor elements of super high purity. Such metals as Cu, Zn, Pb, Ni proved inadequate for new requirements.
(A-general, T1, 17-57; EG-j)

191-A.* Present and Potential Uses for Coal in the Canadian Metallurgical Industry. J. H. Walsh, J. C. Botham and H. P. Hudson. *Canadian Mining and Metallurgical Bulletin,* v. 51, Feb. 1958, p. 81-88. (*Transactions,* v. 51, 1958, p. 57-64)
The coal mining industry of Canada has not benefited to any great extent by the rapid growth of the steel industry. Development of nonblast furnace methods for treatment of ferrous ores and expansion of the nonferrous metals industry may provide new markets. 82 ref.
(A-general, C-general, D-general; RM-j42)

192-A. Nickel Industry in 1957. John F. Thompson. *Iron and Steel,* v. 31, Feb. 1957, p. 69.
(A4p; Ni)

193-A. (French.) **Vanadium.** Lucien Perruche. *Nature,* v. 3265, May 1957, p. 171-172.
Types of ores containing V, locations of deposits; methods of processing, applications, biological effects, brief commercial data.
(A-general; V)

194-A. (French.) **Molybdenum.** Lucien Perruche. *Nature,* v. 3266, June 1957, p. 224-227.
Natural state, extraction processes, properties, uses in steels, chemistry, effects on human organisms.
(A-general; Mo)

195-A. (Hungarian.) **History of Hungarian Art Founding.** Laszlo Jakoby. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 1-8.
20 ref. (To be continued.)
(A2, E-general, T9)

196-A. (Hungarian.) **Metallurgy of High-Purity Iron.** Béla Vécsey. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 18-24.
12 ref. (A-general, Fe-a)

197-A. (Norwegian.) **Vanadium of the Fens Area.** Kaare Wyller Christensen and Thorbjorn M. Holager. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 17, no. 9, 1957, p. 153-155.
Amount of vanadium in samples from Fens in Telemark, Norway. 14 ref. (A11a; V, RM-n)

198-A. (Spanish.) **Titanium, a New Element in Metallurgy.** M. Fuentes Bencomo, C. Gandara and R. Aparacio. *Ion,* v. 17, Nov. 1957, p. 605-612.

History and growth of Ti industry; commercial production methods (Kroll, Hunter, Degussa), laboratory methods, including process being studied by present authors based on electrolysis of Ti tetrachloride in molten bath of alkaline chlorides; smelting processes; physical, mechanical and chemical properties; applications. 29 ref. (A-general; Ti)

199-A. Metallurgy of the Unusual. William J. Kroll. *Chemistry and Industry,* no. 2, Jan. 11, 1958, p. 26-29.

Semi-humorous reminiscences. (A-general)

200-A. Uranium Deposits in Western North Dakota and Eastern Montana. Donald Towse. *Economic Geology,* v. 52, Dec. 1957, p. 904-913.

6 ref. (A4n, A11a; U)

201-A. Cadmium. Arnold M. Lansche. Preprint from "U. S. Bureau of Mines Minerals Yearbook", v. 1, 1955, 10 p.

Domestic production, consumption and uses; stocks, prices, foreign trade, technological developments; world picture. (A4; Cd)

202-A. Manganese. Gilbert L. DeHuff and Teresa Fratta. Preprint from "U. S. Bureau of Mines Minerals Yearbook", v. 1, 1955, 24 p.

U. S. production, consumption, importation statistics, prices, companies involved; technological developments. World production 1946-1955; facilities and operations outside U. S. 54 ref. (A4; Mn)

203-A. Silver. J. P. Ryan and Kathleen M. McBreen. Preprint from "U. S. Bureau of Mines Minerals Yearbook", v. 1, 1955, 18 p.

Production, market, consumption and use in industry and arts, monetary stocks, prices, technology, foreign trade. (A4; Ag)

204-A. Zinc. O. M. Bishop, A. J. Martin and Esther B. Miller. Preprint from "U. S. Bureau of Mines Minerals Yearbook", v. 1, 1955, 46 p.

U. S. production, consumption, prices, companies involved, types of plants, byproducts, stocks. Imports and exports; recent technological progress; world review of production 1946-1955. 43 ref. (A4; Zn)

205-A. (French.) **Metallurgy and Applications of Some Rare Metals.** V. Charrin. *Genie Civil,* v. 135, Jan. 1, 1958, p. 15-19.

(A-general; Cd, Ce, Cb, Ge, Ga, In, Ta)

206-A. (French.) **Recent Progress in the Metallurgy of Titanium and the Manufacture of Titanium Alloys.** *Genie Civil,* v. 135, Feb. 1, 1958, p. 58-64.

(A-general; Ti)

207-A. (German.) **Chromium-Titanium Pearlitic Malleable Iron.** W. Rubel. *Giesserei-Praxis,* Jan. 10, 1958, p. 2-6.

Properties of newly developed material, called CT-55-WOV, are obtained simply by melting, without pre or post treatment. Its advantages enable it to invade markets heretofore reserved for forged parts. (A-general; CI-s, *Cr, Ti*)

208-A. (German.) **Silicosis and Its Control in the Foundry.** Rudolf Bommert. *Giessereitechnik,* v. 3, Nov. 1957, p. 249-254.

(A7n, A8a, E-general)

209-A. (Japanese.) **Copper Deposits of Daiichi Myoho Mine, Yamanashi Prefecture.** Tadashi Kimura and Kojiro Komura. *Geological Survey of Japan, Bulletin,* v. 8, Mar. 1957, p. 41-43.

(A4n; Cu)

210-A. (Japanese.) **Titaniferous Iron Sand Ore Deposits at the Kunisaki Peninsula, Ooita Prefecture.** Ziro Nakazawa and Syuzi Maruyama. *Geological Survey of Japan, Bulletin,* v. 8, May 1957, p. 1-16.

(A4n; Fe, Ti)

211-A. (Japanese.) **Zinc and Lead Deposits in Yasui Mine, Hyogo Prefecture.** Kuman Haraguchi. *Geological Survey of Japan, Bulletin,* v. 8, May 1957, p. 37-40.

(A4n; Pb, Zn)

212-A. (Japanese.) **Cupriferous Pyrite Deposits of Sanyo Mine, Kumamoto Prefecture.** Nobuo Inai. *Geological Survey of Japan, Bulletin,* v. 8, June 1957, p. 49-54.

(A4n; Cu)

213-A.* (Book.) **Metallurgy of Vanadium.** William Rostoker. 185 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Comprehensive treatment of the extraction, physical and mechanical properties, oxidation, corrosion and embrittlement of V. The constitution of V alloy systems, metallography and use as an alloy addition. (A-general; V)

214-A. Power Layouts in Steel Mills. A. J. Mosso. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 111-122.

In designing a satisfactory power layout, a balance must be maintained between cost and reliability. Planning should attempt to reduce maintenance problems, insure personnel safety, and provide access to components. (A5, W11; ST)

215-A.* Is Radiation Safety a Consideration in Working Magnesium-Thorium Alloys? Larry Silverstein. *Magnesium,* Feb. 1958, p. 1-6.

External radiation is not a serious problem; melting and chemical milling may require local exhaust ventilation. Welding presents a hazard unless local exhaust of vapors is used. (A7r; Mg, *Th*)

216-A. Science for Electroplaters. Pt. 34. Cyanide Removal by Ion Exchange. L. Serota. *Metal Finishing,* v. 56, Mar. 1958, p. 72-75.

(A8b, L17)

217-A. Are Metallurgists Prepared for 19XX? R. F. Thomson. *Metal Progress,* v. 73, Mar. 1958, p. 99-106.

The 15th annual William Park Woodside Lecture before the Detroit Chapter A.S.M. While the forseeable problems concerning metallic materials appear formidable in the extreme, the metallurgist has never before had so many good tools to attack them, and there appears no reasons to anticipate anything but success. (A-general, A9)

218-A. Roundup of Ductile Iron Technology. David Matter. *Modern Castings,* v. 33, Mar. 1958, p. 24-27.

(A-general; CI-r)

219-A. (French.) **Boron Steels.** A. Clerc. *Metaux Corrosion Industries,* v. 32, Nov. 1957, p. 409-435.

New improvements in quantitative determination; fabrication of low-alloy boron steels; Cr-Mo-Ti-B and other heat resistant steels; soldering and tempering characteristics; transformations. 65 ref. (A-general; AY, B, *Cr, Mo, Ti,* SGA-h)

220-A. (French-German.) **Statistics and Nonferrous Metals.** J. P. Pfeiffer. *Pro-Metal,* v. 10, Dec. 1957, p. 906-910.

Types of statistics and their usefulness; some American and European statistical publications in nonferrous field. (A4; EG-a38)

221-A. (German.) **Containers and Tubes From Stainless Steel.** P. Schierhold. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 1-6.

A survey of the most important contemporary stainless steels and their properties; use for containers and tubes.
(A-general, W12c, 17-57; SS, 4-60)

222-A. (German.) **Bessemer Steels.** Alfred Krüger. *VDI Zeitschrift,* v. 99, Nov. 11, 1957, p. 1604-1610.

Production methods, types, properties and application fields.
(A-general, D-general; ST-g)

223-A. (Russian.) **Research on Heat Resistant Steels.** A. V. Stanyukovich. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 26-30.

(A-general, A9m; SS, SGA-h)

224-A. Wastes Yield Enriched Uranium. *Chemical and Engineering News,* v. 36, Apr. 14, 1958, p. 50, 52.

Goodyear Atomic recovers valuable U^{235} and U^{238} from decontamination and laboratory waste solutions. (A8b, C19a; U)

225-A. Classification Scheme for Corrosion Topics. D. M. Brasher. *Corrosion Prevention and Control,* v. 5, Feb. 1958, p. 39-42.

Scheme developed by the Corrosion Group, Chemical Research Laboratory, Teddington, England, is based on the Abstract Filing Index of the National Association of Corrosion Engineers (U. S. A.).
(A14d, R-general)

226-A. Copper and Copper Alloys. A Survey of Technical Progress During 1957. E. Voce. *Metallurgia,* v. 57, Jan. 1958, p. 3-15.

309 ref. (A-general; Cu)

227-A.* Production and Properties of Super-Purity Aluminum. T. G. Pearson and H. W. L. Phillips. *Metallurgical Reviews,* v. 2, 1957, p. 305-360.

Production, analysis for minor impurities, determination of a wide range of physical, electrical and chemical properties, recrystallization behavior, fabrication and joining of 99.98% pure Al. 178 ref.
(A-general; Al-a)

228-A. Cup and Saucer Effect. The Case for Improved Steel Inventory Control. F. R. Palmer. *Steel Processing and Conversion,* v. 44, Mar. 1958, p. 137-139, 164-165.

(A5e; ST)

229-A. (Czech.) **Treatment of Waste Water in the Metallurgical Industry.** Eugen Zamrzla. *Hutnické Listy,* v. 13, Feb. 1958, p. 133-140.

16 ref. (A8b)

230-A. (German.) **100 Years of Openhearth Furnace Practice.** Franz Sommer. *Giesserei,* v. 45, Feb. 27, 1958, p. 117-122.

15 ref. (A2, D2; ST)

231-A. (German.) **Manufacturing of Bright Steel.** Herbert Muller. *Industrie-Anzeiger,* v. 79, Oct. 11, 1957, p. 1237-1239.

Manufacturing methods and technical properties.
(A-general, D-general, G18; ST)

232-A. (German.) **Electrochemical Waste Water.** K. Volz. *Metalloberfläche,* v. 12, Jan. 1958, p. 1-4.

Decontamination and disposal after plating and galvanic processes. (A8b, L17)

233-A. (German.) **Cost Calculation for Building and Management of Waste Water Disposal System According to Degussa Process.** E. Asendorf. *Metalloberfläche,* v. 12, Jan. 1958, p. 6-8. (A8b, L17)

234-A. (German.) **Decontamination and Neutralization of Waste Water.** K. H. Hartung. *Metalloberfläche,* v. 12, Jan. 1958, p. 17-21. (A8b, L17)

235-A. (German.) **System Decontamination of Electroplating Waste Water.** P. Douwenga. *Metalloberfläche,* v. 12, Jan. 1958, p. 22-26. (A8b, L17)

236-A. (German.) **Future Metal Resources.** Ferdinand Friedensburg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Dec. 1957, p. 573-576.

Estimates of total amounts of ores; effects of higher prices and improved extraction techniques. (A4, A11a, RM-n)

237-A. (German.) **Present and Future U. S. Mineral Resources.** Elmer W. Pehrson. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Dec. 1957, p. 577-584. (A4; 14-59, NM-e)

238-A. (German.) **Development of Titanium Metallurgy.** Helmut Winterhager. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Dec. 1957, p. 585-592.

12 ref. (A-general, Ti)

239-A. Effluent Problems. F. Wild. *Metal Industry,* v. 92, Jan. 24, 1958, p. 69-71; Feb. 7, 1958, p. 111-113. (A8b, L17)

240-A. (Book.) **Stainless Steel Fabrication.** 386 p. 1957. Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa.

Guide to selection and application. (A-general; SS)

241-A. (Book.) **A Symposium on Uranium and Uranium Dioxide.** Nuclear Metallurgy, v. 4, 1957. IMD. Special Report Series AIME, 143 p. American Institute of Mining, Metallurgical, and Petroleum Engineers, 29 W. 39th St., New York 18, N. Y.

Melting, casting, forging, rolling, cold working and welding of uranium. Preparation and fabrication of uranium dioxide for fuel elements. Papers abstracted separately. (A-general, T11g; U)

242-A. (Book.) **Russian-English Glossary of Solid State Physics.** I. Emin, editor. 90 p. 1958. Consultants Bureau, Inc., 227 W. 17th St., New York 11, N. Y. $10.

Includes over 4000 Russian terms and their English equivalents from solid state theory, crystallography, metallurgy, ferromagnetism, physics of metals and semiconductors. (A-general, 11-67)

243-A. (Book.) **Magnesium in Perspective.** Proceedings, 13th Annual Convention. 1605 p. Oct. 1957. Magnesium Association, 122 E. 42nd St., New York 17, N. Y.

Papers abstracted separately. (A-general; Mg)

244-A. (Book.) **National Symposium on Vacuum Technology Transactions.** E. S. Perry and J. H. Durant, editors. 256 p. 1957. Pergamon Press, Inc., 122 E. 55th St., New York 22, N. Y. $10.

Vacuum techniques in extraction, refining, melting, casting and research. (A-general, C5m, C25, D8m, R1h; 1-73)

245-A. Dust Elimination in Metal Working. A. E. Williams. *Metal Industry,* v. 92, Feb. 14, 1958, p. 130-132.

(To be continued.) (A8a)

246-A. Dust Elimination in Metal Working. A. E. Williams. *Metal Industry,* v. 92, Feb. 21, 1958, p. 147-149.

(Conclusion.) (A8a)

247-A. Effluent Problems. Pt. 3. Plant Layout and Construction. *Metal Industry,* v. 92, Feb. 21, 1958, p. 153-155.

(A8b; 18-67)

248-A. Copper in 1957. Paul E. Grainger. *Metal Industry,* v. 92, Feb. 28, 1958, p. 176.

A survey of world production and consumption. (A4p; Cu)

249-A. Spodumene — Major Source of Lithium. James S. Browning. *U. S. Bureau of Mines Information Circular* 7824, Feb. 1958, 20 p.

111 ref. (A11a, B14, B15, B16; Li)

250-A. Progress in Titanium Research. Matthew A. Hunter. *Washington Academy of Sciences, Journal,* v. 48, Jan. 1958, p. 1-7.

(A9; Ti)

251-A. Removing Dust From Brown Converter Waste Gases. Willi Dehne. *Stahl und Eisen,* v. 77, no. 9, 1957, p. 553-562. (Iron and Steel Institute, Translation no. 543.)

Previously abstracted from original. See item 272-A, 1957. (A8a, D3)

252-A. **Dust Removal in a Strand Sintering Plant.** Bernhardt Weilandt. *Stahl und Eisen,* v. 77, Aug. 8, 1957, p. 1064-1069. (Iron and Steel Institute, Translation no. 665.)

Previously abstracted from original. See item 404-A, 1957.
(A8a, B16; Fe, RM-n)

253-A. **Dust Removal in a Pellet Sintering Plant.** Rudolf Nase. *Stahl und Eisen,* v. 77, Aug. 8, 1957, p. 1070-1074. (Iron and Steel Institute, Translation no. 737.)

Previously abstracted from original. See item 405-A, 1957.
(A8a, B16b, 1-2; Fe, RM-n)

254-A. (German.) **Wetting Agents for the Precipitation of Dust Such as Fine-Grained Iron Oxides in Steel Mill Smoke.** Robert Meldau. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 615-621.

20 ref. (A8a; ST)

255-A. (Russian.) **40 Years Growth of Ural Foundry Industry.** A. A. Gorshkov. *Liteinoe Proizvodstvo,* Jan. 1958, p. 28-32.

20 ref. (A2, E-general)

256-A. **Industry in the World Today.** *Light Metals,* v. 21, Apr. 1958, p. 114-115.

A new development in the U. S. aluminum industry is the direct supply of molten metal from the Al reduction works to an adjacent foundry of the big automobile manufacturers. (A5b; Al)

257-A. **Design Characteristics of Titanium.** Leland W. Long. *Machine Design,* v. 30, Feb. 6, 1958, p. 137-140.

(A-general, 17-51; Ti)

258-A. **These Steels Have What the Users Want.** *Steel,* v. 142, Feb. 17, 1958, p. 126-130.

Properties, applications and composition of U. S. Steel Corp.'s T-1 steel.
(A-general, Q-general; 17-57, ST)

259-A. (French.) **Radioactive Ores: Uranium and Thorium.** *Metallurgie et la Construction Mécanique,* v. 90, Feb. 1958, p. 79-85.

(A-general, P18; U, Th, RM-n)

260-A. (French.) **Spanish Aluminum Industry.** G. A. Baudart. *Revue de l'Aluminium,* v. 35, Jan. 1958, p. 41-44.

History of 30 years of Spanish Al industry and expansion plans of two main producers, Endasa (1100 tons capacity) and Aluminio Espanol (5000 tons). (A5, A2; Al)

261-A. (German.) **Determining Factors in Melting Costs.** A. Hohman. *Giesserei-Praxis,* v. 76, Mar. 1958, p. 81-83.

(A4s, E-general)

262-A. (Portuguese.) **On the Exportation of Manganese From Minas Gerais.** Iphygenio Soares Coehlo. *Engenharia, Mineracao e Metalurgia,* v. 26, Sept. 1957, p. 139-140.

Depletion of Mn ore reserves; proposal for gradual stoppage of exports. (A11a; Mn)

263-A. (Portuguese.) **Expansion of the Steel Industry in Sao Paulo.** Roberto Jafet. *Engenharia, Mineracao e Metalurgia,* v. 26, Sept. 1957, p. 143-150.

(A4; ST)

264-A. (Russian.) **Organization of Repair Work in Steel Mills.** G. B. Antsyshkin. *Metallurg,* Feb. 1958, p. 1-2.

(A5b, 18-72; ST)

265-A. **Thorium and Rare Earth Metals. Their Properties and Applications.** *Genie Civil,* v. 135, Mar. 1958, p. 108-112.

(A-general, Q-general, 17-57; Th, EG-g)

266-A. **Computers Move Into Planning: Mathematical Analysis Proves Out in Tests.** *Iron Age,* v. 181, Apr. 24, 1958, p. 90-91.

(A9n, X14; 18-74)

267-A.* **The Dollars and Sense of Pickle-Liquor Treatment.** James S. Joseph and E. T. Culver. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 112-122.

Disposal method for spent pickle liquor by either neutralization or regeneration; cost factors. Method adopted depends primarily upon volume of liquor to be disposed of. (A8b, L12g)

268-A. **Current Trends in Metal Science and Future Developments in Aluminum Metallurgy.** George J. Mills. *Light Metal Age,* v. 16, Apr. 1958, p. 11-14.

(A9; Al)

269-A. **A 'New Look' for the Light Metal Beryllium: Atomic, Electronics and Missile Industries Brighten Its Future.** *Light Metal Age,* v. 16, Apr. 1958, p. 17-18.

(A-general, 17-57; Be)

270-A.* **Cupro-Nickels Offer Corrosion Resistance and Hot Strength.** J. L. Everhart. *Materials in Design Engineering,* v. 47, May 1958, p. 114-120.

Comprehensive report on properties, fabrication and applications of 70-30, 80-20 and 90-20 Cu-Ni alloys. (A-general, P-general, Q-general; 17-57; Ni, *Cu*)

271-A.* Potential and Future of Molybdenum and Its Alloys. Alvin J. Herzig. Paper from "The Metal Molybdenum", American Society for Metals, p. 4-9.

Ingot weight increased 50 to 100-fold; section size of wrought products 25 to 50-fold; substantial improvements in uniformity and ductility of wrought products. Alloys have been produced having 100-hr. life in creep-rupture tests at 2000° F. under a stress of 50,000 psi.; improvements in the art of fabricating and forming complex shapes from stock of heavy section. (A-general; Mo)

272-A.* Molybdenum Metal Powder. C. H. Toensing. Paper from "The Metal Molybdenum", American Society for Metals, p. 31-50.

Molybdic oxide from ores, physical properties of Mo compounds-molybdenum trioxide (MoO_3), molybdenum dioxide (MoO_2), ammonium molybdate $(NH_4)_2MoO_4$; hydrogen reduction; properties of Mo metal powder. 30 ref. (A11a, P-general; Mo, 6-68, 14-59)

273-A.* Development and Properties of Arc-Cast Molybdenum-Base Alloys. M. Semchyshen. Paper from "The Metal Molybdenum", American Society for Metals, p. 281-329.

Study of castings concerned principally with determination of the solid solubility and nature of the first excess phase developed in molybdenum-rich alloys; effects of alloying elements on deoxidation of Mo and on grain size and microstructure of the castings; alloy systems which are amenable to heat treatment (precipitation hardening) for control of mechanical properties; effects of alloying elements on hardness and hot working characteristics of the castings. 9 ref. (A-general, C5h; Mo-b)

274-A.* Molybdenum Research and Development in Great Britain. L. Northcott. Paper from "The Metal Molybdenum", American Society for Metals, p. 519-529.

Notes on purity, working, properties, welding, constitution, oxidation resistant coatings, Mo coatings. 6 ref. (A-general, A9; Mo)

275-A. (Dutch.) **Metallurgy.** R. J. Forbes. *Metalen,* v. 13, Mar. 31, 1958, p. 111-114.

Iron and steel in the Middle Ages. 6 ref. (To be continued.) (A2; Fe, ST)

276-A. (French.) **Pamiers Plants of Societe Metallurgique d'Imphy.** *Metallurgie et Construction Mécanique,* v. 90, Mar. 1958, p. 171-175.

(A-general, W10; ST)

277-A. (German.) **Basic Considerations on Laying Out Continuous Automatic Machine Lines.** H. Goebel. *Werkstattstechnik und Maschinenbau,* v. 48, Mar. 1958, p. 145-152.

(A5, 18-74)

278-A. (Hungarian.) **History of Metal Casting From Origin Until Introduction of Cast Iron.** Zsak Viktor. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 12-21.

6 ref. (A2, E-general; Cu-s)

279-A. (Hungarian.) **Manufacture and Properties of Uranium.** Hantos Rezsö. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 27-33.

10 ref. (A-general; U)

280-A. (Russian.) **Perspectives for Development of Thomas Steel Production in the USSR.** V. M. Tsitver. *Stal',* Feb. 1958, p. 164-168.

Available raw materials make possible annual output of 10-12 million tons of steel by this method. (A4p, D3, 1-65; ST)

281-A. (Book.) **ASME Handbook—Metals Engineering—Processes.** Roger W. Bolz, Ed. 448 p. 1958. McGraw-Hill Book Co., Inc. 330 W. 42nd St., New York 36, N. Y. $13.50.

Final volume of the ASME Handbook; covers processing of metals into finished products; heat treatment, casting, hot and cold working, powder metallurgy, welding, machining and electroforming. (A-general)

282-A. (Book.) **The Metal Molybdenum.** Julius J. Harwood, Ed. 696 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $12.50.

Properties, fabrication, metallurgy and applications of molybdenum alloys; 23 papers abstracted separately. (A-general; Mo)

283-A. (Book.) **Minerals Yearbook, 1954, Vol 1.** 1419 p. 1958. Government Printing Office, Washington 25, D. C. $4.50.

(A4; 14-59)

284-A.* Wrought Titanium. J. R. Crane. *Birmingham Metallurgical Society, Journal,* v. 38, Mar. 1958, p. 27-54.

Experiences in England with graphite electrode furnace and consumable electrode vacuum furnaces for melting Ti and Ti alloys; forging practice, problems in production of slabs, rods and bars; techniques in machining, rod rolling and grinding. Operations and equipment of hot and cold rolling for production of strip and sheet; descaling procedures, experiences in production of wires and tubes; welding processes. (A-general; Ti)

285-A. Wrought Titanium. New Corrosion Resistant Metal Developed by I.C.I. *British Petroleum Equipment News,* v. 6, no. 3, 1957/1958, p. 53-56.

(A-general; Ti-b)

286-A.* Lithium. D. R. Williamson. *Colorado School of Mines, Mineral Industries Bulletin,* v. 1, Mar. 1958, 8 p.

Mineral sources and world reserves; characteristics of Li metal and Li compounds; processes for concentration and production, Present and prospective uses of Li and Li compounds. Data on production and consumption, companies producing and refining Li products. 60 ref. (A4, B-general; Li)

287-A. Progress Report on Titanium. N. P. Inglis and M. K. McQuillan. *Endeavour,* v. 17, Apr. 1958, p. 77-84.

6 ref. (A-general; Ti)

288-A. Productivity in the Iron and Steel Industry—1945-1956. M. D. J. Brisby. *Engineer,* v. 205, Mar. 1958, p. 425-426.

7 ref. (A4p; ST)

289-A.* History of the Early British Work on Plutonium Metallurgy. J. G. Ball and W. B. H. Lord. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 369-379.

Use of dilatometry and thermal analysis to investigate the allotropy and alloying behavior of Pu, with other work on casting, forging, and extrusion, electrical resistivity, magnetic susceptibility and determination of crystal structures. 10 ref. (A2, A-general; Pu)

290-A. The Development of Handling Techniques for the Study of Plutonium Metal. W. B. H. Lord and M. B. Waldron. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 385-392.

12 ref. (A7r; Pu)

291-A.* The Manufacture and Application of Tungsten Carbide in Australia. W. J. Kelsey. *Institution of Production Engineers Journal,* v. 37, Feb. 1958, p. 92-104.

Development, manufacture, standardization, tool fabrication and application of cemented tungsten carbide.
(A-general, H-general; W, 6-69)

292-A. High Speed Steels—Types and Treatments. *Mechanical World and Engineering Record,* v. 138, Feb. 1958, p. 76-78.

(A-general, Q-general; TS-m)

293-A. How to Treat Pickle Liquors in a Small Plant. Edward W. Lang. *Metal Progress,* v. 73, May 1958, p. 93-96.

A crystallization-regeneration unit at Vulcan Rivet & Bolt Corp., Birmingham, Ala., has solved the problem of disposal of pickle liquors from a 1200-gal. batch tank. The system is based on removing 400-gal. portions of liquor, crystallizing ferrous sulphate for economical disposal and returning regenerated liquor to the tank. (A8b, L12g)

294-A. Better Ways to Fabricate High-Temperature Materials. *Metal Progress,* v. 73, May 1958, p. 97-101.

Aircraft and missile needs are setting the pace for development of improved high-temperature materials and better methods for fabricating them. Investment casting in vacuum opens up a promising area. Slip casting can be used to fabricate parts that cannot be made any other way. Better control of processing variables in wrought fabrication gives improved properties.
(A-general, Q-general, 2-62; SGA-h)

295-A.* Pearlitic Malleable Iron. James H. Lansing. *Metal Progress,* v. 73, May 1958, p. 102-103.

Rapid increase in use of pearlitic malleable castings in recent years presages many new areas of application for the future.
(A-general, 17-57; CI-s)

296-A. Metallurgy in Industry—A Look Ahead. H. S. Turner. *Metal Progress,* v. 73, May 1958, p. 109-110, 174.

To devise the necessary new and cheaper operations, the process metallurgist must work with models and pilot plants (not miniatures of present equipment) and be guided by a thorough knowledge of reaction kinetics. Experimentation with existing full-scale equipment is certain to give results of only limited application and at high cost.
(A9p, 17-56)

297-A. Iron Ore—Review and Outlook. Russell C. Fish. *Mining Congress Journal,* v. 44, Feb. 1958, p. 67-69.

(A4p; Fe, RM-n)

298-A. Treatment of Tin Slags. C. W. Jensen. *Mining Magazine,* v. 98, Feb. 1958, p. 79-81.

Recovery of Sn and W from old slag dumps. (A8d, Sn, W, RM-q)

299-A. Role of Metallurgy in Atomic Energy Technology. Pt. 1. A. Blainey. *South African Institute of Mining and Metallurgy, Journal,* v. 58, Dec. 1957, p. 226-255.

General review. 9 ref. (A-general, W11p)

300-A. Titanium Production Developments Including Metallurgy and Alloying. R. I. Jaffe. Battelle Memorial Institute. (Office of Assistant Secretary of Defense for Research and Development.) *U. S. Office of Technical Services,* PB 121632, Aug. 1957, 102 p. $2.75.

A review. (A-general; Ti)

301-A. A Survey of the Literature on Rhenium. C. T. Sims, E. N. Wyler, G. B. Gains and D. M. Rosenbaum. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 121826, June 1956, 236 p. $4.50.

(A-general, 10-54; Re)

302-A. Alumina-Base Cermets. Pt. 4. J. W. Lindenthall, J. G. Stradley and T. S. Shevlin. Ohio State University Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131342, May 1957, 19 p. $.50.

Studies were made by pre-reacting alumina with easily reducible oxides such as those of Cr, Ni and Co. Compounded into cermet compositions, these mixed oxides promoted wetting or reaction with the metallic constituents. Specimens containing 50 vol. % of iron and 50 vol. % of oxide were developed. They were nearly nonporous, as strong as the metal alone, and their high elastic moduli indicated good bonding. (A-general; Al, Cr, Co, Fe, Ni, 6-70)

303-A. Foamed Metal Developed for Sandwich Construction Core. Pt. 1, 2, 3. J. Bjorksten, J. C. Elliott and R. J. Roth. Bjorksten Research Laboratories, Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131419, 131466, 131467, June 1952, Sept. 1953, May 1954, 3 v., 76 p. $2.25.

Foams prepared from Mg-Al alloys. (A-general, 7-59; Al, Mg)

304-A. Nickel and Its Alloys. J. G. Thompson. National Bureau of Standards Circular 592. Feb. 5, 1958. 87 p. $.60. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

History, occurrence, recovery, refining, microstructure, chemical properties, physical properties, mechanical properties and effect of minor constituents on properties of Ni; industrial melting, casting, fabrication and uses; composition, properties, and applications of important ferrous and nonferrous Ni alloys. 801 ref. (A-general; Ni)

305-A. Some Results of High-Vacuum Metallurgy. W. Scheibe. *Zeitschrift für Metallkunde,* v. 48, no. 3, 1957, p. 91-100. (Henry Brutcher, Altadena, Calif., Translation no. 4111.)

Degassing of plain carbon and alloy steels. Distillation methods (nonferrous, including noble metals), vacuum sintering, vacuum annealing; economics of vacuum metallurgy. (A-general, D9s, C22, B16, J23, 17-53, 1-73)

306-A. Study of Alloys of Magnesium With Various Rare-Earth Metals. N. M. Tikhova and L. A. Afanas'eva. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1958, p. 38-41. (Henry Brutcher, Altadena, Calif., Translation no. 4166.)

(A-general; Mg, *EG-g*)

307-A. Present Economic and Technical Position in the Field of Titanium. Richard Kieffer and Friedrich Benesovsky. *Berg-und Huettenmaennische Monatshefte,* v. 101, 1956, p. 292-300. (Iron and Steel Institute Translation no. 560.)

Previously abstracted from original. See item 211-A, 1957. (A4s, C-general; Ti, RM-n)

308-A. Organization of the Supply of Materials and of Production as a Means for Planning and Management. Werner Schutte, Ulrich Sabass, Hans-Heinrich von Lintig and Anton Schutz. *Stahl und Eisen,* v. 77, Aug. 8, 1957, p. 1045-1064. (Iron and Steel Institute Translation no. 799.)

Previously abstracted from original. See item 403-A, 1957. (A5b; ST)

309-A. (French.) **Progress Report—1955-1956.** *Institut de Recherches de la Siderurgie,* Series B, no. 36, Dec. 1957, 242 p.

Research in the steel industry. (A9h; ST)

310-A. (French.) **Production Costs of Openhearth and Electric Arc Furnaces.** J. C. Robin. *Metallurgie et Construction Mecanique,* v. 90, Apr. 1958, p. 291-293.

(A4s, D2, D5; ST)

311-A. (French.) **Presence of Germanium in Rumanian Ores.** Jeana Buzincu and Maria Nicolaid. *Revue de Métallurgie (Bucarest),* v. 2, 1957, p. 111-112.

(A11a; Ge, RM-n)

312-A. (German.) **Planning the Handling of Bulk Materials in the Ironworks.** Volker von Branconi and Friedrich Wilhelm Griese. *Stahl und Eisen,* v. 78, Apr. 17, 1958, p. 465-475.

(A5a, W12; Fe, RM-n)

313-A. (German.) **Reloading Plants and Storage Yards for Ore on Its Way to the Works Harbor.** Kurt Rosenbaum. *Stahl und Eisen,* v. 78, Apr. 17, 1958, p. 475-483.

(A5, W12; Fe, RM-n)

314-A. (German.) **Future Metal Resources.** Ferdinand Friedensburg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Dec. 1957, p. 573-626.

Estimates of the total amounts of ores; effects of higher prices and improved extraction techniques. (A11a, A4; RM-n)

315-A. (German.) **Present and Future U. S. Mineral Resources.** Elmer W. Pehrson. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Dec. 12, 1957, p. 577-584.

(A4, A11a; RM-n)

316-A. (Portuguese.) **The Steel Industry in the Rio Doce Valley.** Amaro Lanari, Jr. *Engenharia, Mineracao e Metalurgia,* v. 26, Oct. 1957, p. 211-213.

New plant planned with Brazilian-Japanese financing (including Brazilian government participation). Details of planned production program, equipment, flowsheet. (A-general; ST)

317-A. (Portuguese.) **A Suggested Policy on Brazilian Mineral Resources.** Henrique Capper Alves de Souza. *Engenharia, Mineracao e Metalurgia,* v. 26, Oct. 1957, p. 217-223.

(A11a)

318-A. (Portuguese.) **Present Conditions and Possibilities for Development of a Copper Industry in Brazil.** Justo Pinheiro da Fonseca. *Engenharia, Mineracao e Metalurgia,* v. 26, Oct. 1957, p. 224-226.

8 ref. (A-general; Cu)

319-A. (Portuguese.) **The Brazilian Manganese Problem.** Othon Henry Leonardos. *Engenharia, Mineracao e Metalurgia,* v. 26, Nov. 1957, p. 271-276.

Yearly figures on exports of Mn ores from 1900 to 1956; deposits currently known and being worked; importance of Mn to growing Brazilian steel industry. 13 ref. (A4; Mn)

320-A. (Portuguese.) **Present Condition of the Brazilian Lead Industry.** Joao R. Nunes. *Engenharia, Mineracao e Metalurgia,* v. 26, Dec. 1957, p. 349-353.

(A-general; Pb)

321-A. (Portuguese.) **The Brazilian Aluminum Industry.** Waldemar de Lima e Silva. *Engenharia, Mineracao e Metalurgia,* v. 26, Dec. 1957, p. 355-356.

(A-general; Al)

322-A. (Rumanian.) **The Presence of Germanium in Rumanian Ores.** J. Buzincu and M. Nicolaid. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 75-78.

(A11a; Ge, RM-n)

323-A.* (Russian.) **Metallurgical Characteristics of Boron Structural Steels.** O. N. Meshcherinova, L. I. Posysaeva and G. A. Khasin. *Stal',* Jan. 1958, p. 75-81.

Melting technology utilizing Al and Ti for final deoxidation assures proper tempering, fine austenite grains, and good ductility and strength. Production of boron steel, properties of boron steels, grain size, physical properties. 4 ref. (A-general; AY, *B*)

324-A. (Russian.) **Some Problems Concerning Industrial Management.** I. E. Moshkevich. *Stal',* Jan. 1958, p. 82-88.

(A5)

325-A. (Russian.) **Development of Iron and Steel Industry in China.** Goa Yan-Ven. *Stal',* Jan. 1958, p. 91-93.

(A-general; ST)

326-A. (Russian.) **Conference on Coordination of Scientific Research in the Iron and Steel Industry.** M. A. Egorov. *Stal',* Jan. 1958, p. 94-95.

(A9; ST)

327-A. (Spanish.) **The Veracruz Foundry Company, a Mexican Steel Plant.** Fernando Gonzalez V. Paper

from *Second National Congress of the Steel Industry,* Mar. 1957, p. 207-220.
(A-general, D-general; ST)

328-A. (Spanish.) **Economic Future of the Electric Arc Furnace in Mexico.** W. B. Wallis. Paper from *Second National Congress of the Steel Industry,* Mar. 1957, p. 227-232.
(A4, D5; ST)

329-A. (Spanish.) **Glossary of Technical Terminology.** Paper from *Second National Congress of the Steel Industry,* Mar. 1957, p. 298-308.
Definitions of accessories, raw materials, production operations and repairs with reference to blast furnaces, low-shaft furnaces, open-hearth furnaces; electric furnaces and steelmaking processes.
(A-general; ST, 11-67)

330-A. (Spanish.) **Study of Spanish Ball Bearing Steels.** Mario Pujol Roig. *Revista de Ciencia Aplicada,* v. 12, Jan-Feb. 1958, p. 1-15.
Properties and structure of three types of steel having different C, Mn, P, S, Si, Cr, Ni, Cu and Mo contents; effects of addition of V; Jominy test; quenching in oil, water and brine; heat treatment and tables. 19 ref.
(A-general, J-general; ST, SGA-c)

331-A. Manganese. L. Sanderson. *Canadian Mining Journal,* v. 78, Nov. 1957, p. 112-113.
(A-general; Mn)

332-A. Today's "Wonder" Metals. How They'll Look Tomorrow. Robert E. Hulse. *Chemical Processing,* v. 20, Dec. 1957, p. 32-35.
(A-general; Ti)

333-A. Heavy Rare Earths. E. E. Klicker and Adrian M. Gammill. *Chemical Processing,* v. 20, Dec. 1957, p. 38-41, 225.
(A-general; EG-g)

334-A. Recent Trends in Mineral Development in the U.S.S.R. and Western Europe. B. C. Roy. *Geological, Mining and Metallurgical Society of India, Bulletin,* no. 19, Mar. 1957, 56 p.
Discussion of geological surveys and mineral exploitation. (A4n)

335-A. (English.) **A Review of Iron and Steel Technique—Progress in 1957.** Takeshi Yamaoka. *Japan Science Review, Mining and Metallurgy,* v. 2, Mar. 1958, p. 99-107.
(A4, D-general, 10-54; ST)

336-A. (German.) **Bessemer Steels.** Alfred Kruger. *VDI Zeitschrift,* v. 99, Nov. 11, 1957, p. 1604-1610.
Production methods, types, properties and application fields.
(A-general; ST-g)

337-A. (Italian.) **"Meehanite" Cast Iron, an Interesting Material for the Mechanical Engineer.** Alfredo Secciani. *Fonderia,* v. 7, Feb. 1958, p. 61-73.
Review of chemical and physical properties. 19 ref. (A-general, P-general, Q-general; CI)

338-A. (Japanese.) **Soviet Outlook for Pig Iron and Steel Production.** M. Yakata. *Metals,* v. 28, Apr. 1958, p. 251-254.
7 ref. (A4p; ST)

339-A. (Japanese.) **Soviet Special Steels. Heat Treatment Research.** M. B. Pridantsev. *Metals,* v. 28, Apr. 1958, p. 255-259.
(A-general, J-general, Q-general; ST)

340-A. (Japanese.) **Present State of Heat Resistant Alloys. Pt. 2.** S. Mitsubashi and R. Ida. *Metals,* v. 28, Apr. 1958, p. 306-310.
(A-general; SGA-h)

341-A. (Portuguese.) **ACESITA Begins Production of Silicon Plate.** *ABM-Noticiario,* v. 12, Mar. 1958, p. 1-3.
Companhia Acos Especiais Itabira (ACESITA) opened first plant for production of Si steel in Latin America on Oct. 23, 1957. Equipment, specifications of plate to be produced in first operations. Planned production is 12,000 tons per year.
(A-general, W10a; ST, *Si,* 4-53)

342-A. (Russian.) **Advances in Soviet Ferrous Metallurgy.** *Metallurg,* v. 3, Mar. 1958, p. 1-2.
Achievements and failures in fulfillment of 1957 Plan and perspectives for 1958. (A-general; ST)

343-A. (Russian.) **Mechanical Sealing of Blast Heater Burners.** B. I. Ginsburg, A. K. Vulykh, I. I. Liseenko and D. G. Klimenko. *Metallurg,* v. 3, Mar. 1958, p. 7-10.
Method of eliminating hazard created by accumulation of gas around burners. (A8a, W17g)

344-A. Stainless Steels and Heat Resisting Steels. *Aciers Fins & Speciaux,* no. 28, Mar. 1958, p. 102-113.
Tables of composition, heat treatment and physical and mechanical properties. (A-general, Q-general, R-general, SS, SGA-h)

345-A. The Aluminum Industry in India. A. Das Gupta. *Indian Minerals,* v. 11, Apr-June 1957, p. 101-110.
(A9; A1)

346-A. New Developments at Abbey Works, Steel Co. of Wales, Ltd. W. F. Cartwright. *Iron and Coal Trades Review,* v. 175, Dec. 20, 1957, p. 1419-1422.

(A5, ST)

347-A.* Metallurgical Defects in High Speed Steels. E. Niesielski. *Metallurgia,* v. 57, May 1958, p. 233-245.

With special reference to 18-4-1 and 6-5-4-2 types. Defects arising during the manufacture of the steel, during heat treatment of the tools and during processing.
(A-general; TS-m, 9)

348-A. Zirconium and Hafnium. Glen C. Ware. *U. S. Bureau of Mines Minerals Yearbook 1956,* Preprint, 1956, 9 p.

(A-general; Hf, Zr)

349-A. Suitability and Selection of Blast Furnace Slag for Manufacture of Road Ballast. Paul Huttemann. *Stahl und Eisen,* v. 77, Oct. 17, 1957, p. 1436-1442. (Iron and Steel Institute Translation no. 782.)

Previously abstracted from original. See item 51-A, 1958.
(A11c; RM-q)

350-A. (English.) **Metallurgy.** R. J. Forbes. *Metalen,* v. 13, Apr. 15, 1958, p. 129-133.

History of metallurgy in 16th, 17th, and 18th centuries. (Concluded.) (A2)

351-A. (French.) **The Mexican Iron and Steel Industry.** *Metallurgie et la Construction Mecanique,* v. 90, May 1958, p. 333, 335, 337, 339-340.

(A4, D-general; ST)

352-A.* (Portuguese.) Pig Iron for the Production of Ductile Iron. Horace A. Hunnicutt. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 19-29.

Properties and characteristics of ductile iron; effects of chemical elements present in pig on formation of spheroidal graphite; suggested specification for pig suitable for production of ductile iron; notes on composition of Brazilian pig.
(A11a; CI-a, CI-r)

353-A.* (Russian.) New Copper-Base Alloy. K. I. Akimova and A. V. Kurdyumov. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 10-12.

New casting alloy contains about 10% Ni and Al, up to 2% Mn, and up to 0.5% Fe; has favorable casting, mechanical and corrosion properties.
(A-general, E-general, Cu, *Al, Ni*)

354-A. (Russian.) **Removing Carbon Dioxide From Air in Foundries.** Z. V. Babayan. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 13-14.

(A8a, A10d, E-general)

355-A. (Russian.) **New Heat Resistant Magnetic Alloys Alfenol and Thermenol.** *Metallovedenie i Obrabotka Metallov,* no. 2, Feb. 1958, p. 50-51.

6 ref. (A-general, P16, Q-general; Al, Fe, SGA-h)

356-A. (Russian.) **Relation Between Iron and Steel Production.** L. L. Zusman. *Stal',* v. 18, Apr. 1958, p. 358-363.

Apportionment of raw materials and equipment in gearing iron and steel production to meet nation's industrial needs. (A-general, A4p; ST)

357-A. (Book.) **Man, Metals and Modern Magic.** J. Gordon Parr. 1958. 238 p. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $2.95.

Metallurgical experience and knowledge from its beginnings more than 6000 years ago to the present. Practices in shaping Au and Ag, smelting, working, alloying and casting Cu and bronze, reduction of iron ore and production of wrought iron, cast iron and steel. Production and fabrication of Al, alloy steel, Ti, Mg and superalloys. (A2)

358-A. (Book.) **Transactions of American Society for Metals.** Ray T. Bayless, Ed. 1139 p. v. 50. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $10.

Contains 56 papers which were abstracted separately as preprints in 1957. (A-general)

359-A. (Book.) **Automation in Practice.** S. E. Rusinoff. 261 p. 1957. American Technical Society, Chicago, Ill. $6.50.

Survey of automation techniques as applied to various manufacturing and metalworking processes. Implications of automation: principles of the feedback control loop, basic devices for effecting hydraulic pneumatic, electric and electronic functions. Application to metalworking, metal cutting, pressworking, joining, heat treating, casting, metal production and systems of automatic inspection and control.
(A-general, 18-74)

360-A. (Book.) **Cost Finding in the Nonferrous Metals Industry.** 1957. 158 p. The British Nonferrous Metals Federation, Birmingham, England.

General principles, metal cost and computation of metal losses, ex-

pense classifications and allocation, depreciation, estimating and forecasting, cost computation, financial accounts. (A4s, E-general; EG-a38)

361-A. (Book.) **Statistics of the Iron and Steel Industry of Japan for 1957.** 92 p. 1958. Japan Iron and Steel Federation, Tekko Bldg., 1, Marunouchi Chiyoda-Ku, Tokyo.

(A4p; ST)

362-A. (Book.) **Concise International Dictionary of Mechanics and Geology.** English, French, German and Spanish. S. A. Copper. 400 p. 1958. Philosophical Library Inc., 15 East 40th St., New York 16, N. Y. $6.

Includes many metallurgical terms; each language separately indexed. (A-general, 11-17)

363-A. (Book.) **Titanium, the Industry, Its Future, Its Equities.** 100 p. 1957. F. S. Smithers & Co., 1 Wall St., New York 5, N. Y.

Properties, raw material sources, ore processing, Ti production processes, production economics; companies producing Ti metal, Ti markets and equities. 35 ref. (A-general, Ti)

364-A. (Book—German.) **Gmelin's Handbook of Inorganic Chemistry. 8th Ed.. Calcium.** P. B2. Gmelin Institute. 392 p. 1957. Verlag Chemie, GmbH. Weinheim/Bergstr. Germany. $52.56.

Hydrides, oxides, hydroxides, peroxides and nitrogen compounds of calcium. (A-general, 11-68; Ca)

365-A. (Book—German.) **Gmelin's Handbook of Inorganic Chemistry. 8th Ed. System No. 60. Copper. Pt. Bl.** Gmelin Institute. 624 p. 1958. Verlag Chemie GmbH. Weinheim/Bergstr. Germany. $83.76.

Copper compounds with oxygen, nitrogen, the halogens, sulphur, selenium and tellurium. (A-general, 11-68; Cu)

366-A. (Book—German.) **Gmelin's Handbook of Inorganic Chemistry. 8th Ed. Systematic Subject Index.** Gmelin Institute. 58 p. 1957. Verlag Chemie GmbH. Weinheim/Bergstr. Germany. $17.28.

Gmelin classification system. (A-general, 11-68)

367-A. (Book—Spanish.) **Second National Congress of the Steel Industry,** Mar. 1957, Camara Nacional de la Industria Del Hierro y Del Acero, Av. Insurgentes 263, Mexico City 7, Mexico. 100 pesos.

Papers abstracted separately. (A-general; ST)

368-A. Gold. J. P. Ryan and Kathleen M. McBreen. *Bureau of Mines Minerals Yearbook,* Preprint, 1956, 21 p.

Mine production for 1956. (A4p; Au)

369-A. Iron Ore. Horace T. Reno. *Bureau of Mines Minerals Yearbook,* Preprint, 1956, 32 p.

Salient statistics of domestic iron ore activity, 1955-1956. (A4p, RM-n, Fe)

370-A. Secondary Metals—Nonferrous. Archie J. McDermid. *Bureau of Mines Minerals Yearbook,* Preprint, 1956, 30 p.

Production figures for secondary recovery of aluminum, antimony, copper and brass, lead, magnesium, nickel, tin and zinc. (A4p, A11d; Al, Sb, Pb, Cu, Mg, Ni, Sn, Zn)

371-A. Tin. Abbott Renick and John B. Umhau. *Bureau of Mines Minerals Yearbook,* Preprint, 1955, 16 p.

Domestic and foreign production, consumption and foreign trade. (A-general; Sn)

372-A. Uranium. John E. Crawford. *Bureau of Mines Minerals Yearbook,* Preprint, 1955, 30 p.

Domestic production, technology, consumption, uses and foreign trade. 37 ref. (A-general; U)

373-A. A Promising New Metal. Gary Wilcox. *Iowa Engineer,* Apr. 1958, p. 29-30.

Columbium offers excellent promise as a structural metal when temperatures exceed 1800° F. (A-general, 17-57; Cb)

374-A. Production of Ferro-Alloys. G. Volkert. *Iron and Coal Trades Review,* v. 176, Apr. 18, 1958, p. 909-913. (A-general, D8n, D8p; AD-n)

375-A. A Milestone in Ferrous Metallurgy. M. Schofield. *Iron and Steel,* v. 31, May 1958, p. 173-174.

Note on the role of Abraham Darby and other persons involved in a successful conversion from charcoal to coke for the reduction of iron ore in 18th Century England. (A2; RM-j43, Fe)

376-A. Uncommon Engineering Metals. J. P. Denny and L. F. Kendall. *Machine Design,* May 29, 1958, p. 150.

Properties and applications of zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium. (A-general, Zr, Hf, V, Cb, Ta, Cr, Rh)

377-A. Research Laboratories. General Electric Co., Ltd., Wembley. N.

L. Harris. *Metal Industry,* v. 92, May 16, 1958; p. 407-408.
(A9h, N1c, J2k)

378-A. Manganese: Major Strategic Metal. *Mining and Engineering Journal,* v. 69, Pt. 1, Mar. 28, 1958, p. 515-521.
(A-general; Mn)

379-A. Low Grade Ores in North American Steel Production. *Mining Journal,* v. 250, Apr. 18, 1958, p. 441-442.
(A4p, A11a; RM-n)

380-A. Titanium Production Developments Including Metallurgy and Alloying. R. I. Jaffee. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development,* Report 94, 1957, 90 p.
The past, present and future of the Ti industry discussed in terms of cost and quantities of the metal produced. Various methods for melting, casting and fabrication; techniques of descaling, finishing, joining and machining. 26 ref.
(A-general; Ti)

381-A. Is This Steel Really Stainless? F. P. A. Robinson. *South African Engineer,* v. 49, Apr. 1958, p. 17-23.
10 ref. (A-general; SS)

382-A. Bibliography of Nickel. Ethel M. Pratt and Henry R. Cornwall. *U. S. Geological Survey Bulletin 1019-k,* 1958, 60 p.
(A-general, 10-65; Ni)

383-A. Bethlehem Steel Improves Acid Pickling Wastes Treatment Plant. F. B. Milligan. *Wastes Engineering,* v. 29, May 1958, p. 258-260.
(A8b, L12g)

384-A. (English.) **Data on the History of Metallurgy in Hungary. Pt. 6.** A. Schleicher. *Acta Technica,* v. 20, no. 1-2, 1958, p. 137-142.
Sketches of blast furnace and blast engine dated 1816 giving dimensions and other data. 6 ref.
(A2, W17g, Fe)

385-A. (French.) **Aluminium-Lacq.** G. A. Baudart. *Revue de l'Aluminium,* v. 35, Apr. 1958, p. 390-395.
One entirely new plant and additional facilities to be installed in an existing plant will increase French aluminum production by 50%.
(A4p; Al))

386-A. (Portuguese.) **Ferrotitanium.** Manuel Chagas Roquete. *Tecnica,* v. 32, Feb. 1958, p. 321-323.
13 ref. (A-general; AD-n, Fe, Ti)

387-A. Raw Material Supplies and the Future Development of the Iron and Steel Industry. C. R. Wheeler. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 101-109.
Presidential address to the British Iron and Steel Institute.
(A4, A11, D-general; ST)

388-A.* Rare Earths in Industry. K. Vlasov and B. Kogan. *Journal of Scientific and Industrial Research,* v. 17A, Feb. 1958, p. 41-42.
Rare-earth metals in steel, light metals and nuclear reactor applications.
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389-A. Production Problems of Titanium and Its Alloys. E. Swainson and R. L. P. Berry. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development,* Report 95, 1957, 29 p.
Effect of impurities, allotropic transformations, alloying, heat treatment; reduction of Ti; melting techniques; scrap reclamation; primary fabrication including hot working, extrusion and welding. (A-general, C-general, F-general; Ti-b)

390-A. Uranium. John E. Crawford and James Paone. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 46 p.
Production statistics, prices and technology during 1956. (A4p, U)

391-A. Titanium. Jesse A. Miller. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 25 p.
Production and consumption statistics for 1958. (A4p, Ti)

392-A. (French.) **Nitriding of Iron Was Utilized by the Ancients.** Jean R. Marechal. *Métaux Corrosion-Industries,* no. 391, Mar. 1958, p. 133-137.
(A2, J28k; CI)

393-A.* High-Boron Alloy Steels. T. H. Middleham, J. R. Rait and E. W. Colbeck. *British Nuclear Energy Conference, Journal,* v. 3, Apr. 1958, p. 116-135.
New technique for the production of steels containing up to about 4.75% B which can be forged, rolled and extruded, and alloys up to about 6% B which can be cast. Methods of manufacture, physical and mechanical properties, and constitution of these steels; applications in thermal nuclear reactors. 23 ref.
(A-general, T11, 17-57; AY, *B*)

394-A. Survey of Developments in the Titanium Industry During 1956. T. H. Janes. *Canadian Department*

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395-A. Story of Stainless Steel. *Chicago Purchasor,* v. 36, Jan. 1958, p. 108.
Mechanical, physical and corrosion resistance properties of the three classifications of stainless steels: chromium-hardenable (400 series); chromium-nonhardenable; chromium-nickel (300 series).
(A-general; SS)

396-A. The Structure of Steel. Pt. 5. Alloy Steels. Edwin Gregory and Eric N. Simons. *Edgar Allen News,* v. 37, May 1958, p. 101-103.
Role of chromium, vanadium, molybdenum, tungsten and cobalt in steel. (To be continued.) (A-general, 2-60; AY, *Cr, V, Mo, W, Co*)

397-A. Raw Materials and the Future Development of the Iron and Steel Industry. C. R. Wheller. *Iron and Coal Trades Review,* v. 176, May 23, 1958, p. 1213-1218.
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398-A. Low-Copper Brasses. Aleksander Krupkowski and Czeslaw Adamski. *Polish Academy of Sciences, Review,* v. 2, July-Dec. 1957, p. 64-70.
Composition and properties of some Polish alloys.
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402-A. Copper. A. D. McMahon and Gertrude N. Greenspoon. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 48 p.
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403-A. Manganese. Gilbert L. DeHuff and Teresa Fratta. *U. S. Bureau of Mines Yearbook,* Preprint, 1956, 24 p.
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407-A. Thorium, Uranium Stockpiling, and Nuclear Fuel. David F. Shaw. Paper from "Recent Developments in Uranium Milling Technology", Uranium Institute of America, p. 88-99.
(A11a, T11g; Th, U)

408-A. Developments in Steel and Titanium. *Aircraft Engineering,* v. 30, Mar. 1958, p. 72.
At William Jenning and Sons Ltd., Brightside Works, Sheffield, England. (A-general; ST, Ti)

409-A. Uncommon Engineering Metals. J. P. Denny and L. F. Kendall, Jr. *American Society of Mechanical Engineers,* Paper no. 58-MD-4, Apr. 1958, 9 p.
Physical and mechanical properties, uses of zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium. (A-general; Zr, Hf, V, Cb, Ta, Cr, Rh)

410-A. Rapid Increase of Use and Production of Sodium Metal. W. Schweisheimer. *Australasian Engineer,* v. 50, Nov. 7, 1957, p. 61-63.
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411-A. Magnesium and Its Alloys. R. Westwood. *Australasian Engineer,* v. 50, Mar. 7, 1958, p. 63-68.
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412-A. The Process Uses of Bituminous Coal in Ferrous Metallurgy.

R. A. Glenn and J. W. Jacoby. *Bituminous Coal Research,* v. 18, no. 1, Spring 1958, p. 11-14.
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413-A. Evaluation of the Blaw-Knox Ruthner Pilot Plant Program. J. H. Strassburger. *Blast Furnace and Steel Plant,* v. 46, June 1958, p. 587-594.
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416-A. Today's "Wonder" Metals—How They'll Look Tomorrow. Robert E. Hulse. *Chemical Processing,* v. 20, Dec. 1957, p. 32-35.
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(A4p; Ti, Zr, Hf)

417-A. Heavy Rare Earths—Husky Youngsters of the Atomic Age. E. E. Klicker and Adrian M. Gammill. *Chemical Processing,* v. 20, Dec. 1957, p. 38-41, 225-228.
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418-A. Lithium. D. R. Williamson. *Colorado School of Mines, Mineral Industries Bulletin,* v. 1, Mar. 1958, 8 p.
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419-A. The Research Program of American Iron and Steel Institute. E. C. Bain. *Engineering Sciences, Technical Paper,* v. 4, no. 11, 1957, 37 p.
15 ref. (A9, D-general; Fe, ST)

420-A. Uses of Fluorspar Associated With the Aluminum and Steel Industries. Richard E. Kerr. *Engineering Sciences, Technical Paper,* v. 4, no. 43, 1957, 12 p.
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General discussion of geological surveys and mineral exploitation.
(A11a)

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Research activity at Jamshedpur, India. (A9h)

424-A. Canadian Occurrences of Columbium and Tantalum Minerals. *Mining Journal,* v. 250, Mar. 28, 1958, p. 352-353.
(A11a; Ta, Cb, RM-n)

425-A. Beryllium Handling—Reducing the Health Risk. R. O. R. Brooks. *Nuclear Power,* v. 3, Mar. 1958, p. 112-114.
(A7, A5a; Be)

426-A. Bauxite. Richard C. Wilmot, Arden C. Sullivan and Mary E. Trought. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 22 p.
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(A4p, A4s; Al, RM-n)

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Production and consumption for 1956. 9 ref. (A4p; Be)

428-A. Cadmium. Arnold M. Lansche. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 10 p.
Production statistics and prices for 1956. 4 ref. (A4p, A4s; Cd)

429-A. Chromium. Wilmer McInnis and Hilda V. Heidrich. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 16 p.
Production and consumption during 1956. 27 ref. (A4p; Cr)

430-A. Cobalt. Hubert W. Davis and Charlotte R. Buck. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 14 p.
Production and consumption during 1956. 19 ref (A4p; Co)

431-A. Iron and Steel. James C. O. Harris. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 27 p.
Production statistics and prices for 1956. 29 ref. (A4p, A4s; Fe, ST)

432-A. Magnesium. H. B. Camstock. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 10 p.
Production statistics and prices for 1956. 31 ref. (A4p, A4s; Mg)

433-A. Platinum-Group Metals. J. P. Ryan and Kathleen M. McBreen. *U. S. Bureau of Mines Minerals Yearbook,* Preprint, 1956, 16 p.

Production statistics and prices for 1956. 12 ref. (A4p, A4s; EG-c)

434-A. Vanadium. Phillip M. Busch and Kathleen McNulty. *U. S. Bureau of Mines Mineral Yearbook,* Preprint, 1956, 10 p.

Production statistics and prices for 1956. (A4p, A4s; V)

435-A. (German.) **Austria's Contribution to the Development of Metallurgy of Iron.** H. Malzacher. *Oesterreichische Ingenieur Zeitschrift,* no. 4, Apr. 1958, p. 173-175.

(A-general; Fe)

436-A. (Russian.) **Production of Nonaging Boron Steel and Its Properties.** Kh. Levinzon and A. D. Litvinenko. *Stal',* v. 18, Mar. 1958, p. 249-252.

A review of recent literature. 9 ref. (A-general; AY, *B*)

437-A. (Pamphlet.) **A Perspective of Molybdenum-Base Alloys.** Alvin J. Herzig. *American Society for Testing Materials,* 1957, 33 p.

Sixth Gillett Memorial Lecture. Properties, applications, effect of alloying additions and fabrication. (A-general; Mo)

438-A. (Book.) **Kaiser Aluminum Sheet and Plate Product Information.** 2nd Ed. 1958. 308 p. Kaiser Aluminum & Chemical Sales, Inc., 919 N. Michigan Ave., Chicago 11, Ill. $5.

Manufacture, availability, physical and chemical attributes; basic facts helpful in the proper selection and use of Al sheet and plate alloys; fabrication and finishing methods. (A-general; Al, 4-53)

439-A. (Book.) **Metal Industry Handbook and Directory.** 544 p. 1958. Iliffe and Sons Ltd., Dorset House, Stamford St., S.E.1, London, England. (Free.)

General properties of metals and alloys; data and tables; electroplating and allied processes; directories of trade names, metal and allied trades associations and scientific and technical institutions. (A-general; 11-67)

440-A. (Book.) **Metal Statistics.** 51st Ed., 1958. 400 p. American Metal Market, 18 Cliff St., New York 38, N. Y. $3.50.

Covers important metals from Al and Be to V and Zn. Approximately one-third of the data deals with iron and steel. Among the new data tables added this year are bauxite production, chromite production and shipments of Al foil. (A4)

441-A. (Book.) **Safety in Welding and Cutting. American Standard Z49.1-1958.** 49 p. 1958. American Welding Society, 33 W. 39th St., New York 18, N. Y. $2.

(A7, K1, K3, G22h)

442-A. (Book.) **Wire Industry Encyclopaedic Handbook,** 484 p. 1958. Wire Industry, Ltd., 33 Furnival St., London, E.C.4, England. (Free.)

Glossary, tables; directories of manufacturers and associations. (A-general, 4-61, 11-67)

443-A. (Book.) **Yearbook of the American Bureau of Metal Statistics.** 136 p. June 1958. American Bureau of Metal Statistics, 50 Broadway, New York, N. Y. $4.50.

Statistical information concerning mine production, smelter production, consumption, imports and exports and other economic statistics on a world-wide basis. (A4p)

444-A. (Book—German.) **Metals in Mechanical Engineering.** 2nd Ed. E. Bickel. 439 p. 1958. Lange & Springer, Reichpietschufer 20, Berlin W 35, Germany. DM. 37.50.

Selection of metals for various applications; structure of metals; properties and testing. (A-general, 17-57)

445-A. Health and Safety in Foundries. George Barnett. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 17-30.

Foundry hazards caused by dust and fumes. Other types of injuries and preventive measures. 51 ref. (A7p, E-general)

446-A.* New Commutator Alloy Takes the Heat. Webster Hodge. *Iron Age,* v. 182, July 10, 1958, p. 102-103.

Designed especially for use in small electric motors and alternators, this special Zr-Cu alloy can retain its strength at high temperatures. (A-general; Q-general, T1, 17-57; Zr, Cu)

447-A. The Future of Titanium. Tom Margerison. *New Scientist,* v. 4, June 12, 1958, p. 156-158.

Prospects are excellent due to excellent corrosion resistance and an eventual reduction in costs which will result from increased volume of production. (A-general; Ti)

448-A. New Developments in Steelmaking in Europe. D. L. McBride. *Society of Automotive Engineers, Preprint* 30C, Mar. 1958, 9 p.

13 ref. (A-general, D-general; ST)

449-A. Some Aspects of Handling Mercury. J. G. S. Biram. *Vacuum,* v. 5, Oct. 1955, p. 77-91.

47 ref. (A7; Hg)

450-A. The Economics of Heat and Power Utilization of Energy in a Mixed Iron Works as Affected by Technical Developments. Hans Weineck. *Stahl und Eisen,* v. 77, July 25, 1957, p. 988-998. (Iron and Steel Institute Translation no. 661.)

Previously abstracted from original. See item 379-A, 1957.
(A11e, D-general; Fe, ST)

451-A. The Utilization of Energy in a Mixed Iron Works. Fritz Stolzenberg and Hermann Tiemayer. *Stahl und Eisen,* v. 77, July 25, 1957, p. 998-1006. (Iron and Steel Institute Translation no. 662.)

Previously abstracted from original. See item 380-A, 1957.
(A11e, W10; ST)

452-A. (Japanese.) **Present State of Heat Resistant Alloys. Pt. 4.** T. Mitsubashi and T. Ita. *Metals,* v. 28, June 1958, p. 459-463.

(A-general; SGA-h)

453-A. (Japanese.) **Progress and Present State of Soviet Iron and Steel Industry.** T. Aoki. *Metals.* v. 28, June 1958, p. 466-471.

(A4, D-general; ST)

454-A.* Low-Cost Cryogenic Steel Goes Commercial. J. Procter. *Chemical Engineering,* v. 65, July 14, 1958, p. 160-164.

New 9% Ni alloy has high tensile and yield strength at low temperatures (to −350° F.).
(A-general; SS, Ni, 2-63)

455-A.* Gray Iron Has Unique Wear-Resistant Properties. Joseph R. Diear. *Foundry,* v. 86, Aug. 1958, p. 62-63.

Amount and structure of graphite on iron has a strong influence on boundary lubrication properties. Proper graphite structure prevents galling and welding during time of metal-to-metal contact.
(A-general; CI-n)

456-A.* Modifications to the Fontana Open Hearth Precipitators. Earl V. Akerlow. *Iron and Steel Engineer,* v. 35, July 1958, p. 97-103.

Dry electrostatic precipitators at Kaiser Steel Corp., Oakland, Calif., employ saturable reactor control with selenium rectifier transformers as well as conventional mechanical rectifier equipment, special collecting and discharging electrodes, specially designed rapping equipment and gas distribution apparatus.
(A8a, W13c)

457-A.* Safeguarding Steel Production. R. M. L. Russell. *Iron and Steel Engineer,* v. 35, July 1958, p. 112-123.

"Hot spots" in steel mills; prevention, control and extinguishing of fires; carbon dioxide systems, automatic sprinkler systems. (A7)

458-A.* The Growing Canadian Steel Industry. D. S. Holbrook. *Iron and Steel Engineer,* v. 35, July 1958, p. 133-136.

Canadian government's tax policy on depreciation stimulates expansion and efficient practice.
(A-general; ST)

459-A.* Strength Skyrockets in Formable Titanium. *Machine Design,* v. 30, July 10, 1958, p. 12, 14.

Three new solution treated anneal Ti alloys have extremely high strength-weight ratio, excellent corrosion resistance.
(A-general; Ti, Al, Mo, V)

460-A.* (German.) **Recent Developments in Whiteheart, Blackheart and Pearlitic Malleable Cast Iron.** A. Hohmann. *Giesserei-Praxis,* v. 76, Apr. 10, 1958, p. 117-119.

German standards GTW 35, GTW 40, GTS 35 and GTS 40, as well as U. S. standard and pearlitic malleable cast irons discussed; processing; properties. Tempering in Cr-Ni steel container advised, proper ratio of pig and scrap in percent. Emphasizes improved properties through induction hardening, gives scheme of suitable equipment with data of current and temperatures. New aspects in production through growing use pointed out.
(A-general, S22; CI-s)

461-A.* (German.) **"Erftal", a High Gloss Mill Aluminum.** H. Ginsberg, R. Lattey and H. Neunzig. *Metall,* v. 12, June 1958, p. 497-501.

Aluminum (99.9% Al, < 0.04% Fe), can be brought to a high gloss finish thrcugh repeated annealing. Through the annealing the remaining impurities are kept in solution and are equally distributed. An addition of chromium acid to the finishing bath increased the reflecting properties. This process is particularly advantageous for consumer goods. Tables of composition, micrographs and reflection properties in relation to heat treatment.
(A-general, J23a; Al-a)

462-A. How to Set Production Standards for Pouring, Shifting and Shake-

out. J. E. Keith. *Foundry*, v. 86, July 1958, p. 85-89.

(A5d, E-general)

463-A.* Investment Casting Directory. Section 1. Technical Section. *Precision Metal Molding*, v. 16, June 1958, p. 58-61.

Data on composition of ferrous and nonferrous alloys commonly investment cast; mechanical properties of alloys in the as-cast and hardened conditions; includes aluminum, copper, nickel, cobalt, and magnesium-base alloys, carbon, low alloy, stainless and special steels. (A-general, E15)

464-A. Progress in Research in Iron and Steel Usage. *Sheet Metal Industries*, v. 35, July 1958, p. 543-547, 551.

Survey of the Annual Report of the British Iron and Steel Research Association for 1957. Topics covered include cold rolling, sheet and strip processing, tinplate manufacture, plastic-coated steel, structural engineering steels, corrosion and high-temperature steels. (A-general; ST)

465-A.* Iron-Aluminum Base Alloys. Cheap Stainlesses of the Future. Blake King, J. J. Mueller, N. N. Ida and F. G. Tate. *Society of Automotive Engineers, Preprint 60B*, 1958, 20 p.

Experimental alloys prepared by the Martin Co., compare favorably in strength and ductility at both high and low temperatures with the ferritic stainless steels. 9 ref. (A-general; Al, Fe)

466-A. Hypereutectic Aluminum-Silicon Alloys. Richard M. Smith. *Society for Automotive Engineers, Preprint 65A*, 1958, 8 p.

Evaluation of foundry characteristics, physical and mechanical properties, corrosion resistance. (A-general; Al, Si)

467-A.* Workhorses of the Industry: PH Stainless Steels. J. N. Barnett and W. W. Rohde. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 6-9.

Composition and properties of 17-7 PH, 17-4 PH and 15-7 PH stainless steels. (A-general; SS)

468-A.* Metal Strengths at High Temperatures. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 10-11.

Table giving Himatic tensile strength, yield strength, elongation and modulus of elasticity for several Al, Mg, Ti, Ni and Co alloys from room temperature to 1000° F. (A-general, 2-62)

469-A.* "Exotic" Metals. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 10-11.

Table giving mechanical properties of Be, Ti, Mo, Ta, V, 25TiV, W from room temperature to 4000° F. (A-general, 2-62)

470-A.* Average Properties of Structural Carbon and Graphite. *Aviation Age, Research and Development Technical Handbook*, 1958-59, p. 12.

Table showing commercial designation, available sizes and properties. (A-general; RM-h39)

471-A.* New Hardenable Titanium. Robert W. Carson. *Product Engineering*, v. 29, July 21, 1958, p. 68-69.

Age-hardening alloy combines high strength (up to 240,000 psi.), corrosion resistance of pure Ti, service temperatures of 600 to 800° F. and the highest strength-weight ratios available. (A-general; Ti)

472-A.* New Super Alloy Bids for Hot Jobs. F. Kenneth Iverson and M. A. Pohlman. *Product Engineering*, v. 29, July 21, 1958, p. 76-77.

New high-temperature Ni superalloy, Rene 41, has improved stress-rupture strength, good ductility and formability, low distortion, good weldability, corrosion resistance. (A-general, Q-general; Ni, SGA-h)

473-A. (Russian.) **How to Make Effective Use of Metal Shavings.** I. N. Goncharov, I. A. Azarov and Yu. G. Dorofeev. *Vestnik Machinostroeniya*, v. 38, June 1958, p. 46-49.

Shavings are pressed into briquettes in a specially built furnace under hammer pressure. Machine parts made from these briquettes were three times stronger than those made from original steel. (A11d; ST)

474-A. Pulsometer-Tett Water-Treatment Processes. *Corrosion Technology*, v. 5, July 1958, p. 225-226.

Chemical reagents are added to correct overhardness, softness, acidity or alkalinity and to form a flocculent precipitation on the surface of the filtering medium to trap over 95% of the bacteria and other matter in suspension minute enough to pass through the filtering medium. (A8b, NMa-38)

475-A. U_3O_8 Production Now Under Way at Ambrosia Lake District. John B. Huttl. *Engineering and Mining Journal*, v. 159, July 1958, p. 86-92.

(A11a, B12p; U)

476-A. Safety Saves Money at Albion Malleable Iron Co. Jack C. Miske. *Foundry,* v. 86, Aug. 1958, p. 54-57.
(A7p, E-general)

477-A. System Prevents Waste Buildup in Central Coolant Supply. A. B. Myler. *Iron Age,* v. 182, July 31, 1958, p. 56-57.

Automatic continuous removal of fine metal particles from coolant is accomplished by two flotation cells, in which the fines are trapped in a froth of aerated oil and skimmed off. (A8b, A11d)

478-A. Three-Point Plan Reduces Scrap Handling. *Iron and Steel Engineer,* v. 35, June 1958, p. 141-143.
(A5a; RM-p)

479-A. Proizvodstvo Sovetskogo Soyuza (Made in Russia). *Reynolds Review,* v. 18, July-Aug. 1958, p. 2-8.

Russian Al industry. (A4; Al)

480-A. Chemistry and Metallurgy of Titanium Production. J. J. Gray and A. Carter. *Royal Institute of Chemistry, Lectures, Monographs and Reports,* no. 1, 1958, 56 p.

Titanium ore reduction, isolation, analysis, extraction processes, melting practice, ingot processing, physical and mechanical properties. 99 ref. (A-general; Ti)

481-A. (German.) **St 52 With Vanadium and Titanium Additions.** St. Kronmarck. *Technik,* Jan. 1958, p. 19-28.
14 ref. (A-general; AY, *Ti, V*)

482-A. (German.) **Ferromagnetic Materials and Their Application.** G. Sommerkorn and H. Staeblein. *Elektro-Anzeiger,* no. 7, Feb. 12, 1958, p. 47-51.
(A-general, 17-57; SGA-n)

483-A. (German.) **Historical Development of the Electric-Arc Furnace for Steel Plants.** L. Arends. *Elektrowaerme,* Oct. 1957, p. 345-354.
6 ref. (A2, W18s; ST)

484-A. (German.) **Nodular Cast Iron.** K. Kessler. *Industrie-Anzeiger,* no. 35, May 2, 1958, p. 26-27.
(A-general; CI-r)

485-A. (German.) **Sewer Water Treatment in the Metal Industry.** B. Wedekind. *Metall,* v. 12, June 1958, p. 515-519.
18 ref. (A8b)

486-A. (German.) **Uranium-Iron Alloys.** Th. Geiger and C. Fizzotti. *Schweizer Archiv,* Jan. 1958, p. 27-32.
8 ref. (A-general; U, Fe)

487-A. (German.) **Health Hazards Caused by Bessemer Slag, Vanadium Slag, and Vanadium Compounds.** Walter Reinl. *Staub,* v. 18, May 1, 1958, p. 143-148.
37 ref. (A7; RM-q, V)

488-A. (German.) **Possibility of a Connection Between "Dreckapotheke" and Hardening Agent for Steel.** Ernst-Hermann Schulz. *Sudhoff's Archiv für Geschichte der Medizin und der Naturwissenschaften,* v. 42, Mar. 1958, p. 62-64.

"Dreckapotheke", blood, urine and excrements of men and animals, as hardening agents for steel according to recipe-books of the Middle Ages. (A2, J28; ST)

489-A. (German.) **Titanium Alloys.** W. Hess. *Technica,* no. 23, Nov. 8, 1958, p. 1311-1313.
(A-general; Ti-b)

490-A. (German.) **Nodular Cast Iron—a New Structural Material.** A. Wittmoser. *VDI-Berichte,* v. 27, 1958, p. 5.
(A-general; CI-r)

491-A. (Italian.) **The Italian Origin of the Hydroelectric Trompe.** Bruno Boni. *Fonderia Italiana,* v. 7, May 1958, p. 161-168.
(A2, D-general; ST)

492-A.* The New Precipitation-Hardening Stainless Steels for Super-Sonic Craft. Allen C. Gilbraith. *Australian Machinery and Production Engineering,* v. 11, May 1958, p. 23-31.

Properties and applications of 17-7 PH, 17-4 PH, NM 350 stainless steels after various heat treatments.
(A-general; SS)

493-A.* Crucible Steel Introduces Three New Heat-Treatable Titanium Alloys. *Industrial Laboratories,* Aug. 1958, p. 30-31.

New beta alloy B-120VCA (13V-11Cr-3Al) has the highest strength and best formability of any Ti-base material. Data also for C-105VA (alpha-beta type containing nominally 16% V and 2.5% Al); and C-115 A Mo V.
(A-general, J-general: Ti-b)

494-A. Magnesium. L. Sanderson. *Canadian Mining Journal,* v. 79, June 1958, p. 102-103.

Properties, metallurgy and uses.
(A-general; Mg)

495-A. Above 2,500° F., What Material to Use? Luther D. Loch. *Chemical Engineering,* v. 65, June 30, 1958, p. 105-109.

New developments in theory and applications of high-temperature processing presage broader uses for super refractories.
(A-general, Q-general; SGA-h)

496-A. The Metal That Changed Canada. *Electrical News and Engineering*, v. 67, June 1958, p. 115-117.

Influence of Al on industrial development of Canada.
(A-general; Al)

497-A. What Does the Future Hold for Numerical Controls? G. S. Knopf. *Iron Age*, v. 182, July 24, 1958, p. 77-80.

(A5, 18-74)

498-A. Old Ironworks in Belgium and Luxemburg. R. W. Allott. *Iron and Coal Trades Review*, v. 176, June 13, 1958, p. 1437-1438.

(A2; Fe)

499-A. Fifty Years of Metallurgical Science. A. G. Quarrell. *Journal of the Institute of Metals*, v. 86, July 1958, p. 475-484.

Historical review with emphasis on atomic studies, alloy development, various metallurgical phenomena. 32 ref. (A2; 10-54)

500-A. Heavy Metal Solves Weighty Problems. Annesta R. Gardner. *Product Engineering*, v. 29, July 21, 1958, p. 62-64.

Heavy metals, a group of high-density, 90% tungsten alloys, are finding increased use as counterweights, rotating elements and radiation shields. High density and adequate machinability available.
(A-general; W-b)

501-A. (English.) **Present Status and Future of the Titanium Industry in the U. S.** Herbert H. Kellogg. *Schweizer Archiv*, v. 24, Jan. 1958, p. 14-20.

(A4p; Ti-b)

502-A. (French.) **French Foundry Industry.** Réne Lebeau. *Métallurgie et la Construction Mécanique*, v. 90, June 1958, p. 467-470.

Importance and classification of castings according to special uses; diversity of founding activity; exports. (A4p, E-general)

503-A. (German.) **Diseases Caused by Thomas Slag, Vanadium Slag and Its Compounds.** Walter Reinl. *Staub*, v. 18, June 1, 1958, p. 177-181.

42 ref. (A7n; Rm-q)

504-A. (Russian.) **Automation Progress in Ferrous Metallurgy.** A. K. Adabash'yav. *Metallurg*, v. 3, May 1958, p. 1-3.

Output of blast and openhearths doubled since 1940 as result of automation. Plans for 1958-1965—to advance from automation of specific processes to fully automated plants in all fields of metallurgy.
(A-general, D1, D2, 18-74)

505-A.* How to Treat and Fabricate Beryllium Copper. *Metalworking Production*, v. 102, July 25, 1958, p. 1311-1315.

Summary of fabrication techniques, annealing and pickling and joining methods for Mallory 73 Be-Cu strip. (A-general; Cu, Be)

506-A.* Report on the Engineering Properties of Commercial Titanium Alloys. M. W. Mote, R. B. Hooper and P. D. Frost. Battelle Memorial Institute, Titanium Metallurgical Laboratory, TML Report no. 92, June 4, 1958, 56 p.

Extensive analysis of the effect of alloy components in Ti; available commercial Ti mill products; mechanical properties; fabrication characteristics; promising new alloys, data on specific alloys. (A-general, T-general, Q-general; Ti-B)

507-A.* Vascojet 1000 Provides High Strength Over Wide Temperature Ranges. John C. Hamaker, Jr. *SAE Journal*, v. 66, July 1958, p. 68-73.

Utilizing an entirely new heat-treating concept for structural materials, a 5% Cr steel, VascoJet 1000, demonstrates outstanding advantages for high-strength parts operating at temperatures between −100 and 1000° F. (A-general; SS, Cr)

508-A.* (Russian.) **Influence of Alloying Elements on Properties of Chromium-Nickel-Molybdenum-Copper Steel.** E. V. Zotova. *Stal'*, June 1958, p. 550-556.

Investigation of several grades of Cr-Ni-Mo-Cu steel with varying content of these elements to determine grades of steel suitable for welded structures and cast machine parts which are stable in hot solutions of sulphuric acid. Recommend steel with content of 8-23% Cr, 18-20% Ni, 3% Mo and 3% Cu. 9 ref.
(A-general; SS, Cr, Cu, Ni, Mo)

509-A. Development of Wrought Aluminum-Magnesium Alloys. E. H. Dix, Jr., W. A. Anderson and M. Byron Shumaker. *Aluminum Co. of America, Technical Paper no. 14*, 1958, p. 1-63.

Report of two new Al-Mg alloys, one a high-strength nonheat-treatable alloy, the other suitable for high-temperature use.
(A-general; Al-b, Mg-b)

510-A. Copper and Its Alloys—Pt. 3. Nickel and Silver. E. Voce. *Copper*, no. 3, Summer 1958, p. 17-20.

Composition and properties of wrought Ni-Ag and Ni brasses.
(A-general; Cu-b, Cu-n, Ni, Ag)

511-A. (German and French.) **History of the Arc Welding Electrode.** F. Wörtmann. *Zeitschrift für Schweisstechnik,* v. 47, Nov. 1957, p. 279-287. (Concluded.) (A2, W29h)

512-A. (Russian.) **Perspectives for Development of Iron and Steel Industry in the Georgian SSR.** N. G. Gomelauri. *Stal',* June 1958, p. 486-488.
(A-general; ST)

513-A. (Pamphlet.) **Recommended Safe Practices for Inert-Gas Metal Arc Welding.** 9 p. 1958. American Welding Society, 33 W. 39th St., New York 18, N. Y. $1.

Potential hazards peculiar to inert-gas metal-arc process; recommendations for controls. 5 ref. (A7p, K1)

514-A.* (Pamphlet.) **The Supply of Nickel—1958-1961.** May 1958, 12 p. International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

Present and future production capacity; available stocks; consumption in North America and the free world. (A4, A11a; Ni)

515-A. (Book.) **Engineering Materials.** 607 p. 1958. Pittman Publishing Corp., 2 W. 45th St., New York 3, N. Y. $8.50.

Background information on construction and other engineering materials, their production and principal properties. One-third of text is devoted to metals, covering structure and constitution of metals and alloys, manufacture, shaping, properties, uses, etc., of cast iron, steel, wrought iron, malleable cast iron, nonferrous metals and alloys, corrosion and anti-corrosion protection, testing of materials. (A-general)

516-A.* **New Engineering Metals.** J. P. Denny and L. F. Kendall. *Mechanical Engineering,* v. 80, Aug. 1958, p. 67-71.

Availability, properties, prices of zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium. (A-general; Cr, Cb, Hf, Ta, V, Zr, Rh)

517-A. Development of ZM41 Magnesium Sheet Alloy. H. A. Johnson and R. D. Masteller. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131417, Sept. 1957, 29 p. $.75.

Magnesium alloy system was superior to AZ31 sheet alloy. Designated ZM41, the new alloy has a nominal composition of 4% Zn, 1.0% Mn, 0.7% mischmetal, balance Mg. ZM41 showed consistently better tensile properties than AZ31B, together with more uniform properties in the transverse and longitudinal directions. ZM41-mischmetal alloys displayed an increased resistance to corrosion compared to AZ31B. The new alloy can tolerate a greater amount of iron than AZ31B without seriously decreasing corrosion resistance. Mischmetal was found to increase the hot rollability of Mg-Zn alloys. (A-general; Mg, Zn)

518-A.* **Why Should I Use Titanium?** Paul M. Tyler. *Metal Progress,* v. 74, Aug. 1958, p. 110-114.

The inherent advantages of Ti and improvements achieved by alloying. Contrasted with these are some disadvantages largely reflected in difficulties in fabrication. The Sheet Rolling Program is one organized attack to solve some of the latter problems. (A-general, 17-57; Ti)

519-A.* (French.) **Manufacture and Properties of Spheroidal Graphite Cast Iron.** M. Eudier and L. Hallot. *Metaux-Corrosion-Industries,* v. 33, May 1958, p. 212-227.

Composition of starting material and effects of various elements on structure and properties of SG iron; use of basic and acid cupolas; Mg alloys used in treating molten metal; methods of introducing Mg into bath and into ladle; mechanical properties of specimens and parts in SG iron; heat treatment of SG irons. (A-general; CI-r)

520-A.* **Centrifugal Castings. Pt. 1. Ferrous Metals.** John L. Everhart. *Materials in Design Engineering,* v. 48, Aug. 1958, p. 89-93.

Advantages and disadvantages of centrifugal castings of carbon steels, alloy steels, stainless steels and gray iron. Applications and typical properties tabulated. 8 ref.
(A-general; 5-65, CN, AY, SS, CI)

521-A. Magnesium Alloys With High Melting Point Additions. R. R. Nash. Rensselaer Polytechnic Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131198, Mar. 1957, 196 p. $5.

Determination of alloying characteristics, influence on microstructures, mechanical properties and corrosion resistance of additions of high melting point elements to Mg and Mg-base alloys.
(A-general; Mg-b, AD-q)

522-A. How Can We Hurdle the "Materials Roadblock"? Irwin Stam-

bler. *Aviation Age,* v. 30, Aug. 1958, p. 18-19, 93-97.

Research trends in high-temperature alloys. (A-general;SGA-h, 17-57)

523-A. Evaluation of the Blaw-Knox—Ruthner Pilot Plant. J. H. Strassburger. *Blast Furnace and Steel Plant,* v. 46, June 1958, p. 587-594.

Process compares favorably with existing processes for recovery of usable H_2SO_4, HCl and FeO. (A8b, A9j)

524-A. Notes on the Geochemistry and Economic Concentration of Vanadium. D. R. Williamson. *Colorado School of Mines Mineral Industries Bulletin,* v. 1, July 1958, 16 p.

36 ref. (A11a, B-general; V)

525-A. New PERA Workshops. *Iron and Steel,* v. 31, July 1958, p. 365-368.

Research facilities and metal cutting and forming research at Melton Mowbray of Production Engineering Research Association of Great Britain. (A9h, G-general)

526-A. Wrought and Cast Magnesium-Thorium and Magnesium-Zirconium Alloys. *Materials in Design Engineering,* v. 48, July 1958, p. 121, 123.

Fabricating properties and corrosion resistance of wrought and cast Mg-Th and Mg-Zr alloys. Alloys include HM31X, HM21A-T8, HK31A, ZK60A-F, EZ33A, HZ32A, ZH62A and ZK51A. (A-general, P-general, Q-general, R-general; Mg, *Th, Zr)*

527-A. Growth of the Titanium Industry. Paul M. Tyler. *Metal Progress,* v. 74, July 1958, p. 97-100, 170, 172, 174, 176.

At a cost of six years' time, $250,000,000 of the Government's money plus nearly $100,000,000 of private capital, a complete Ti industry has been established in America. (A11a; Ti)

528-A. Forecast of an Information Center. Majorie R. Hyslop. *Metal Progress,* v. 74, July 1958, p. 108-111.

The A.S.M.'s research project at Western Reserve University has progressed far enough to prove that penetrating searches of technical and scientific literature can be made electronically. The first commercial service will very likely be to send to individual subscribers information about documents appearing currently in any chosen portion of the metallurgical field. (A14e)

529-A. The Titanium Situation. Herbert H. Kellogg. Digest of "Present Status and Future of the Titanium Industry in the U. S." *Metal Progress,* v. 74, July 1958, p. 185-186. (From *Schweizer Archiv für Angewandte Wissenschaft und Technik,* Jan. 1958.)

Future Ti cost and production estimates. (A4; Ti)

530-A. Vacuum Melted Alloys. *Metal Progress,* v. 74, Aug. 1958, p. 96B-96D.

Data sheet indicating grade, composition, source and applications of vacuum-melted alloys from 17 manufacturers. (A-general, C5k, 1-73)

531-A. IRSID Opens Pilot-Plant Laboratories. *Metal Progress,* v. 74, Aug. 1958, p. 123-124.

New research station of the French Iron and Steel Research Institute (IRSID) equipped primarily to study iron ore and hot metal techniques, will operate on tonnage sufficient to extrapolate full-scale methods. (A9j, B-general, D-general; Fe, ST)

532-A. A Simulation of Melting Shop Operations by Means of a Computer. R. Neate and W. J. Dacey. *Process Control and Automation,* v. 5, July 1958, p. 264-271.

(A9n, X14; ST)

533-A. Planning and Operating an Industrial Waste Disposal Plant. G. J. O'Kane. *Products Finishing,* v. 22, Aug. 1958, p. 38-45.

Waste disposal plant installed as part of the plating operations produces an almost colorless, clear effluent, free of detectable cyanides, cyanates, chromic acid or copper. (A8b, L17)

534-A. The Challenge of High Temperatures. F. D. Richardson. *Times Science Review (London),* no. 28, Summer 1958, p. 2.

High-temperature equipment and materials; refractories, future development. (A-general, 2-62; SGA-h)

535-A. Metallochemical Table of the Elements. I. I. Kornilov. *Academy of Sciences of the USSR, Proceedings,* v. 114, 1957, p. 449-452. (Translation by Consultants Bureau, Inc.)

Characteristics of the chemical reactions of metals with elements of the periodic system. Families of metals are shown capable of forming continuous solid solutions, limited solid solutions with metallic compounds, metallic compounds without solid solutions, compounds of an ionic type. 6 ref. (A-general, P10)

536-A. (French.) **Properties and Applications of Spheroidal Graphite Alloy Cast Irons.** J. Grilliat. *Metaux-Corrosion-Industries,* v. 33, May 1958, p. 228-242.

16 ref.
(A-general, Q-general, 17-57; CI-r)

537-A. (French.) **Canadian Aluminum Industry.** Michel C. Hugueney. *Revue de l'Aluminium,* v. 35, May 1958, p. 511-514.

Origins and growth of industry during and since World War II.
(A2, A4; Al)

538-A. (German.) **Measurement of Gas Traces in the Ironworks.** Fritz Bangert. *Stahl und Eisen,* v. 78, May 29, 1958, p. 743-747.

Measurement of gas traces by means of a portable gas detection apparatus. Dust measurements with a diaphragm filter. Continuous and automatic measurement of carbon monoxide in combination with warning devices. (A8a, X7h, E-general)

539-A. (Portuguese.) **Brazilian Steel Industry Perspectives.** Joao G. Haenl. *Engenharia, Mineracao e Metalurgia,* v. 27, May 1958, p. 259-262.

(A-general; ST)

540-A.* **PH Stainless Steels Beat the Heat.** J. N. Barnett and W. W. Rohde. *Aeronautical Procurement,* Aug. 1958, p. 21, 41.

Properties, applications of PH 15-7 Mo, 17-7 PH, 17-4 PH steels.
(A-general, Q-general, 17-57; SS, SGA-h)

541-A.* **Iron and Phosphate Slag From Byproduct Ferrophosphorus.** J. M. Potts, W. C. Scott, Jr., J. U. Campbell and J. A. Wilbanks. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 148-151.

Process and furnace for converting byproduct ferrophosphorus into high-grade iron for metallurgical purposes and phosphatic slag that might be used as a fertilizer or animal-feed supplement. The process involves smelting ferrophosphorus, siliceous iron ore and burnt lime in an electric furnace. Refractory problem was solved through the use of a two-component furnace. 6 ref.
(A11d, W17; Fe, RM-q)

542-A.* (Spanish.) **Steel Industry in the United States.** Enrique O. Monge. *Universidad Nacional de Ingenieria, Boletin,* v. 30, July-Sept. 1957, p. 3-34.

Survey of raw material consumption, processing, melting, rolling and other steel mill operations. Furnaces and rolling equipment and types of products turned out.
(A-general, D-general, F23; ST)

543-A. **Cobalt in High-Temperature Alloys, Special Report No. 1.** F. R. Morral. *Battelle Memorial Institute,* 1958, 12 p.

Cobalt production, consumption and availability; properties of Co and Co alloys.
(A-general; Co, SGA-h)

544-A. **Aspects of Russian Engineering Industry.** *Machinery (London),* v. 93, Aug. 6, 1958, p. 286-300.

Russian machine tool facility at Sverdlov. (A-general, W25)

545-A. **Development of Metal Ceramics.** *Platinum Metals Review,* v. 2, Apr. 1958, p. 53-54.

(A-general; Pt, SGA-h, 6-70)

546-A. **Composition of Beryllium Borides.** L. Ya. Markovskii. *Doklady Akademii Nauk SSSR,* v. 101, no. 1, 1955, p. 97-98. (Henry Brutcher, Altadena, Calif., Translation no. 4091.)

(A-general; Be, B)

547-A. **The Metallurgy of Boron Structural Steels.** O. N. Meshcherinov. *Stal',* v. 18, no. 1, 1958, p. 75-81. (Henry Brutcher, Altadena, Calif., Translation no. 4256.)

Previously abstracted from original. See item 323-A, 1958.
(A-general; AY, B)

548-A. (French.) **New Ultra-Light Magnesium-Base Alloys.** *Genie Civil,* v. 135, June 1, 1958, p. 249-253.

(A-general; Mg-b)

549-A. (German.) **New Techniques for Selecting Employees in a Modern Cold Rolling Mill.** Werner Fuchs. *Stahl und Eisen,* v. 78, July 10, 1958, p. 974-977.

(A5, F23, 1-67; ST)

550-A. (Hungarian.) **Properties and Applications of Aluminum-Bronze Castings.** Gyula Emod. *Kohaszati Lapok-Ontode,* v. 91, Apr. 1958, p. 90-95.

6 ref. (A-general, Q-general, 17-57; *Al*, Cu-s, 5-60)

551-A. (Russian.) **Comparison of Metallurgical Progress Between U.S.A. and U.S.S.R.** V. A. Podzerko. *Metallurg*, v. 3, July 1958, p. 1-5.

(A-general)

552-A.* **Regeneration of Waste Pickle Liquor to Produce Ferrous Sulfate Monohydrate.** J. S. Atwood, J. S. Joseph and W. W. Hodge. *Engineering Bulletin, Twelfth Industrial Waste Conference, Proceedings*, no. 94, May 1957, p. 378-389.

Monohydrate process is cheapest method for handling over 10,000 gal. per day of waste acid. 7 ref. (A8b, L12g, NM-a31)

553-A. Iron - Chromium - Aluminum Alloys. J. E. Srawley. Naval Research Laboratory. *U. S. Office of Technical Services*, PB 131676, Apr. 1958, 19 p. $.50.

Alloys containing up to 25% Cr and 11% Al were produced by vacuum melting and hot worked by forging. When compared with Type 310 stainless steel, they were brittle at room and moderately high temperatures and weak above about 1200° F. Nevertheless, the alloys' oxidation resistance over-rode these disadvantages in some high-temperature applications, and tests showed that they are resistant to attack by combustion products of residual fuel oils. (A-general, Q-general, 2-62, R1h; Al, Cr, Fe, 4-51)

554-A.* (French.) **New Properties and Applications of Metals of Very High Purity.** G. Chaudron. *Revue de Metallurgie*, v. 55, May 1958, p. 407-416.

Purification of many common metals to the order of parts per million brings about many new physical properties. Results with Al and Fe include the appearance of polygonization and the competition between this phenomenon and recrystallization; high conductivity at low temperature; resistance to chemical attack and virtually complete suppression of certain diffusion phenonema. 21 ref.
(A-general, P-general, N-general, 3-69; Al-a, Fe-a)

555-A. (Rumanian.) **Thermo-Insulating Refractory Articles Made From Metallurgical Slag.** Al. Braniski, V. Siniansky and C. Cleper. *Studii si Cercetari Metalurgie*, no. 2, 1956, p. 369-377.

Laboratory investigations to determine possibility of utilizing porous, blast furnace slags in the manufacture of refractory thermo-insulating materials.
(A11d, D1, 17-57; RM-q)

556-A. (Chinese.) **A New Form of Commercial Material—Cast Iron With Spheroidal Graphite.** Chan I-Kwei. *Uli Tunbao*, no. 1, 1956, p. 9-15.

Survey of spheroidal-graphite cast iron, its production, properties and use. Tables list mechanical and physical properties and results of trials to determine tensile strength at high and low temperatures.
(A-general, CI-r)

557-A. Kaiser Steel Appropriates $214,000,000 to Expand Its Services to the Growing West. Charles Longenecker. *Blast Furnace and Steel Plant*, v. 46, Aug. 1958, p. 814-863.

Plant layout and equipment at Kaiser's Fontana, Calif., plant.
(A-general, W-general, 18-67; ST)

558-A. Kazakhstan—New Land of Soviet Metallurgy in Asia. R. Sewell. *British Steelmaker*, v. 24, July 1958, p. 212-213.

Steel production and resources of iron and other ores in Kazakhstan.
(A4p, A11a; Fe, ST, RM-n)

559-A. (French.) **Where Will the Belgian Steel Industry Obtain Iron Ore in the Future?** *Echo des Mines et de la Metallurgie*, no. 3516, May 1958, p. 287-288.

(A11a; Fe, RM-n)

560-A. (French.) **Contribution of Research on Corrosion and Protection of Metals to the Development of Modern Engineering.** Georges Chaudron. *Industrie Chimique Belgique*, v. 23, Apr. 1958, p. 355-365.

10 ref. (A9, L-general, R-general)

561-A. (German.) **Usefulness of Economy Studies in Foundry Work.** A. Herrmann. *Giesserei Praxis*, v. 14, July 25, 1958, p. 275-278.

(A4s, W19)

562-A. (German.) **Characteristics of Nonmagnetic Cast Iron Alloys.** Z. Tyszko. *Giesserei Praxis*, v. 14, July 25, 1958, p. 280-281.

(A-general, P-16, 2-60; CI, AD-n)

563-A.* (Czech.) **New Properties of Soviet Transformer Steels.** *Hutnicke Listy*, no. 3, 1956, p. 169-170.

Classification of transformer steels by Si content, magnetic properties, sheet thickness and rolling technology. Some new Soviet transformer steels compared to Czecho-

slovakian, German and American steels. (A-general; ST, SGA-n)

564-A. Manganese and Chrome Ore Outlook. John M. Warde and Eileen P. Burke. *Mining Engineering,* v. 10, Aug. 1958, p. 868-873.

(A11a; RM-n; Mn, Cr)

565-A. Beryllium Production Soars. *Steel,* v. 143, Aug. 8, 1958, p. 50-51.

(A4p; Be)

566-A. (French.) **Current Trends in the Steel Industry.** Rene Damien. *Industrie Nationale,* Apr-June 1958, p. 19-40.

(A4; ST)

567-A. (Hungarian.) **Notes About Aluminum-Titanium-Vanadium Alloys.** K. R. Vassel. *Kohaszati Lapok,* v. 11, no. 11-12, 1956, p. 522-528.

Properties of the alloys of Ti with V and Al. 10 ref.
(A-general, Q-general; Al, Ti, V)

568-A. (Russian.) **Titanium, Its Alloys and Field of Application.** N. T. Gudtsov and L. D. Mashyakova. *Vestnik Akademii Nauk SSSR,* no. 2, 1957, p. 59-68.

History of ores, production of the metal, mechanical and engineering properties, heat treatment of Ti alloys and their use in various branches of industry.
(A-general; Ti)

569-A. (Book.) **Radiation Effects on Materials. Vol. 2.** 140 p. 1958. American Society for Testing Materials, Special Technical Publication. STP 220, 1916 Race St., Philadelphia 3, Pa. $3.75.

(A-general; S19; 2-67)

570-A. (Book.) **German-English, English German Iron and Steel Dictionary.** 272 p. 1958. Verlag Stahleisen m.b.H., Breite Strasse 27, Dusseldorf, Germany. 12.50 Marks.

Contains more than 7000 words in metallurgical, mechanical and electrical practice.
(A-general; 11-67)

571-A. (Book—Dutch, French, English, Spanish.) **Metal Products From Holland.** 340 p. 1958. Association of Metal Working Industries. Nassaulaan 13, The Hague, Netherlands.

Guide to Dutch metal products includes list of manufacturers, classified and alphabetical indexes.
(A-general, 11-67)

572-A.* (German.) **Dressing Dolomite During Thermal Production of Magnesium.** Ladislaus Jakoby. *Freiberger Forschungshefte,* no. B28, June 15, 1957, p. 42-49.

Study of dolomite in Hungary, its geology, possibility of its recovery and choice of fuel for silico-thermal reduction; availability of Hungary's energy resources.
(A-general; Mg, RM-n)

573-A.* (Italian.) **Germanium.** Giovanni Porro. *Industria Mineraria,* v. 9, Apr. 1958, p. 199-213.

Geology and mineralogy of Tsumeb deposits in Southwest Africa; extraction cycles employed in U. S., Belgium, Italy and Katanga; atomic structure and behavior of Ge; techniques of preparation of semiconductor Ge monocrystals; applications. 18 ref. (A-general; Ge)

574-A.* Metallurgy in Nuclear Engineering. Survey of the Literature in 1957. Pt. 2. J. Burkett. *Metallurgia,* v. 58, Aug. 1958, p. 64-66.

Metallurgy of reactor fuels—thorium, uranium, uranium dioxide, plutonium; welding of materials for nuclear reactors. 68 ref.
(A-general, T11, 17-57; U, Th, Pu)

575-A.* New Magnesium Alloys. R. J. M. Payne and N. Bailey. *Metallurgia,* v. 58, Aug. 1958, p. 67-68.

Series of Mg alloys useful in both cast and wrought conditions. Known as the M.S.R. alloys, they contain Ag, rare earth metals and Zr, and have higher proof stress figures than existing Mg alloys.
(A-general, Q27; Mg-b)

576-A.* (Polish.) **Analysis of the World Trend of Expansion of Rolling Mills for Production of Welded Tubes.** Wladyslaw Dobrucki. *Hutnik,* v. 25, Apr-May 1958, p. 156-164.

World production of tubes and present trend of capital investment in the industry. Improvements of tube rolling mills; economical factors and policies influencing fast growth of the mills. 32 ref.
(A4p, W23h; ST)

577-A. Working With Beryllium. *Light Metal Age,* v. 16, Aug. 1958, p. 6-9.

(A7q; Be)

578-A. New Air-Hardenable Steel Has 280,000 Psi. Tensile Strength. *Machine Design,* v. 30, Sept. 18, 1958, p. 38-39.

Airsteel X-200 developed by U. S. Steel. (A-general, Q27a; ST)

579-A. Plant Layout Case Studies. *Metalworking Production,* v. 102, Aug. 15, 1958, p. 1419-1425.
(A5; 18-67)

580-A. (Czech.) **Planning of Metallurgical Transport.** Jan Polasek and Emanuel Zelinka. *Hutnické Listy,* v. 13, no. 7, 1958, p. 626-631.
Material transport considerations in choosing locations and laying out metallurgical plants. 5 ref.
(A5a, 18-51, 18-67)

581-A. (German.) **Lead and Zinc World Trends.** W. Macking. *Metall,* v. 12, Aug. 1958, p. 745-750.
(A-general; Pb, Zn)

582-A. (German.) **The U. S. Lead and Zinc Dilemma.** F. A. Pinkerneil. *Metall,* v. 12, Aug. 1958, p. 753-754.
(A4p; Pb, Zn)

583-A. (German.) **Over-Production of Lead and Zinc.** J. Vuillequez. *Metall,* v. 12, Aug. 1958, p. 755.
(A4p; Pb, Zn)

584-A. (German.) **Tariff Policies Concerning Lead, Zinc and Their Alloys.** H. J. Rathlein and H. Schatz. *Metall,* v. 12, Aug. 1958, p. 756-758.
(A4q; Pd, Zn)

585-A. (German.) **World Production of Beryllium.** R. Kerschagl. *Metall,* v. 12, Aug. 1958, p. 762-763.
(A4p; Be)

586-A. (German.) **Decontamination and Neutralization of Industrial Waste.** Erich Lutter. *Metallwaren-Industrie und Galvanotechnik,* v. 49, July 1958, p. 280-297.
Problems encountered in filtering deposits containing Cr compounds. Comparison of different methods now being used. Importance of lowering cost of operation. 36 ref.
(A8b; Cr)

587-A. (German.) **Observations on Operational Practices in American Steel Mills. Pt. 1. Working Habits and Efficiency. Pt. 2. Differences in Organization Practice.** Werner Schütte and Helmut Spitzer. *Stahl und Eisen,* v. 78, June 26, 1958, p. 873-882.
Differences between German and American management and operation practice. 8 ref. (A5; ST)

588-A. (Japanese.) **Choice of Heat Resistant Steel.** Taro Hasegawa. *Metals,* v. 28, July 1958, p. 537-541.
General discussion of heat resistant steel for gas turbines.
(A-general, W11m; SGA-h)

589-A. (Portuguese.) **Present Possibilities for the Manufacture of Sponge Iron in Brazil.** Anchyes C. Lopes. *Engenharia, Mineracao e Metalurgia,* v. 28, July 1958, p. 15-17.
Several Brazilian steel producers could make competatively priced sponge iron using locally available raw materials and fuels. (A11, D8j)

590-A. (Russian.) **Utilization of Secondary Power Resources of the Metallurgical Industry.** V. D. Pashkov. *Stal',* v. 18, July 1958, p. 660-667.
Use of waste furnace gas for developing steam at 2.5 atm. pressure for use in openhearth cooling system; for developing steam at 3-5 atm. for boilers; for gas turbines to increase volume of compressed blast furnace gases. (A11c; Fe, EG-m44)

591-A. Development of ZM41 Magnesium Sheet Alloy. H. A. Johnson and R. D. Masteller. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131417, Sept. 1957, 30 p. $.75.
Alloy system which appears superior to AZ31 has nominal composition of 4% Zn, 1% Mn, 0.7% mischmetal, balance Mg. ZM41 alloy, compared to AZ31, has higher strength, more uniform longitudinal and transverse tensile properties, and a much greater tolerance for iron without corrosion resistance being adversely affected.
(A-general, Q-general; Mg-b, 4-53)

592-A.* **New Titanium Alloys.** (Digest of "Titanium Alloys for Air and Spacecraft", Walter L. Finlay, M. B. Vordahl and R. F. Malone. Presented at Technical Forum, Crucible Steel Co. of America, Pittsburgh, June 26, 1958). *Metal Progess,* v. 74, Sept. 1958, p. 134, 136, 138, 140, 142, 145.
Comparative review of properties and application with special reference to B 120 VCA, C 120AV, C 115 AMoV, C 105VA, and C 135 AMo.
(A-general, Q-general, 17-57; Ti-b)

593-A.* (Russian.) **Physical-Chemical Properties and Fields of Application of Rare Metals.** E. M. Savitskii. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 2-13. (Henry Brutcher, Altadena, Calif., Translation no. 4311.)
Ten-fold increase in production of rare metals in recent years. Application to armaments, aviation, missiles and atomic energy. General review of light rare metals, infusible rare metals, dispersed rare metals, rare earth metals and radioactive rare metals. Application to machine building, chemical, radio-

technical and other branches of industry. 22 ref.
(A-general, 17-57; EG-g)

594-A.* Constitution, Production and Mechanical Properties of Ni-Resist. R. Barton. *British Cast Iron Research Association, Journal,* v. 7, Aug. 1958, p. 299-315.

Constitution, composition, structure and physical and mechanical properties of Ni-Resist, austenitic cast iron. Cupola practice, foundry technique, machining speeds, corrosion resistance, typical applications. 10 ref. (A-general; CI-q; *Ni*)

595-A. Production Control Without Paperwork. *Canadian Metalworking,* v. 21, Sept. 1958, p. 16, 18.

Monitoring production of machinery units and subassembly line, new system records number of parts produced, the time involved and feeds this to centrally-located dispatch room. (A5; 18-74)

596-A. Chemistry and Metallurgy of Titanium. *Engineer,* v. 206, Aug. 29, 1958, p. 334-335.

Properties, applications and heat treatment. (A-general; Ti)

597-A. How Good Plant Layout Cuts Costs. J. L. Martin. *Iron Age,* v. 182, Sept. 25, 1958, p. 85-87.

(A5; 18-67)

598-A. Treat Flue Dust to Recover Iron. John Mitchell and A. C. Sediachek. *Iron Age,* v. 182, Sept. 25, 1958, p. 96-97.

Ferrocoke, a carbonized blend of coal and blast furnace flue dust, is an easy, practical, and technically feasible way to use flue dust.
(A8a, A11d; Fe)

599-A. Air and Water Pollution in the Iron and Steel Industry. A. Parker. *Iron and Steel Institute. Journal,* v. 189, Aug. 1958, p. 297-302.

(A8a, A8b; ST)

600-A. Present and Future Uses of Titanium. Paul M. Tyler. *Metal Progress,* v. 74, Sept. 1958, p. 109-112, 170, 172, 174, 176, 178, 180, 182.

Ti sheet and forgings now cost so much that uses are restricted: 90% of American production goes into jet engines for the Air Force. In a mature industry with integrated plants, costs would be cut to one-fifth, thus opening large new markets in chemical equipment and wheeled vehicles. (A4s, 17-57; Ti)

601-A. Recent Statistics on Metallurgical Education. W. O. Philbrook. *Metal Progress,* v. 74, Sept. 1958, p. 113-114.

Nearly 10% more degrees in metallurgy were granted in 1957 than in 1956. The number of B.S. degrees fell just short of 600 but was up 9.5% over the previous year. Masters, with 176 degrees, were up 8%. Doctors totalled 83, up 9%.
(A3g)

602-A. Silicon: Present and Future. Walter E. Remmers. *Modern Castings,* v. 34, Oct. 1958, p. 47-52.

Current and possible future applications of Si and Si compounds.
(A-general; Si)

603-A. Standard for Production, Processing, Handling, and Storage of Titanium. *National Fire Protection Association,* NFPA no. 481, 1958, 32 p. $.50.

(A7, S22; Ti)

604-A. Arsenic. A. D. McMahon and Gertrude N. Greenspoon. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 6 p.

Production statistics and prices for 1957. (A4p; As)

605-A. Beryllium. Donald E. Eilertsen. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 7 p.

Production statistics and prices for 1957. 18 ref. (A4p; Be)

606-A. Bismuth. H. M. Callaway and Edith den Hartog. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 6 p.

Production statistics and prices for 1957. (A4p; Bi)

607-A. Cobalt. Hubert W. Davis and Charlotte R. Buck. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 13 p.

Production statistics and prices for 1957. 14 ref. (A4p; Co)

608-A. Columbium and Tantalum. William R. Barton. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 14 p.

Production statistics and prices for 1957. 49 ref. (A4p; Cb, Ta)

609-A. Lithium. Albert E. Schreck. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 7 p.

Production statistics and prices for 1957. 20 ref. (A4p; Li)

610-A. Magnesium. H. B. Comstock. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 9 p.

Production statistics and prices for 1957. (A4p; Mg)

611-A. Review of Metallurgical Technology. Earl T. Hayes. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 5 p.

(A-general, B-general, C-general)

612-A. Sodium and Sodium Compounds. Robert T. MacMillan and Annie L. Mattila. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 6 p.

Production statistics and prices for 1957. 19 ref. (A4p; Na)

613-A. (Russian.) **Hydraulic Removal of Waste Molding Sand.** A. A. Dudnik. *Liteinoe Proizvodstvo,* July 1958, p. 13-16.

Installation which simultaneously removes waste sand, purifies the air and cleans the water in cast iron foundry at a 50% reduction in cost. (A8d, W19h; CI)

614-A. (Russian.) **Installation for Dehydration of High-Viscosity Fuel Oils.** I. V. Belov, V. S. Ozhiganov and P. B. Shalaev. *Stal',* v. 18, Aug. 1958, p. 755-758.

(A11c; RM-k)

615-A. (Russian.) **Dehydration of Fuel Oil by Using Waste Heat of Flue Gases of Industrial Furnaces.** F. Z. Babuskin and D. Ya. Feiderov. *Stal',* v. 18, Aug. 1958, p. 753-755.

(A11c; RM-k)

616-A. The Role of Thorium in the Nuclear Field. John P. Howe. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 1-19.

Nuclear reactions connected with the use of Th; reactor types which can use the material; mode of use in these reactors; requirements and processing of Th-base components; economic factors. 11 ref. (A-general, T11g; Th)

617-A. Hazards Associated With Thorium Metallurgy. A. F. Voigt. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 296-315.

Sources of potential danger confronting personnel who handle Th through metallurgical operations are chemical toxicity, radiological toxicity and fire and explosion hazards. Maximum permissible levels for Th concentration in air. 18 ref. (A7; Th)

618-A. (Pamphlet.) **Charting Steel's Progress.** 69 p. 1958. American Iron and Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Statistical summary of materials, capacity, growth, distribution, wages and working conditions relating to the steel industry in 1957. (A4b)

619-A.* (Book.) **Beryllium Copper.** Copper Development Association, Publication no. 54, 55 South Audley St., London, W. 1, England. 1958. 61 p.

Physical and mechanical properties, resistance to corrosion, foundry practice, working, machining, joining, applications, safe handling. The alloys' strength, hardness and corrosion resistance recommend application as springs, dies, welding electrodes and nonsparking tools. 70 ref. (A-general; Cu-b, *Be*)

620-A. (Book.) **The Metal Thorium.** 397 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $10.

Proceedings of the Conference on Thorium held Oct. 11, 1956, at Cleveland, under joint sponsorship of A.E.C. and A.S.M. Papers abstracted separately. (A-general; Th)

621-A. (Book-German.) **Gmelins Handbook of Inorganic Chemistry. Germanium. 8th Ed. System 45. Supplement.** 576 p. 1958. Verlag Chemie, GmbH. Weinheim/Bergstrasse, West Germany. $79.68.

Research for the period 1931-1953. Recovery, refinement and properties, with emphasis on semiconductor applications. (A-general; Ge)

622-A. (Book-German.) **Gmelins Handbook of Inorganic Chemistry. Hafnium. 8th Ed. System 43. Supplement.** 23 p. 1958. Verlag Chemie, GmbH. Weinheim/Bergstrasse, West Germany.

Geochemistry, separation properties. (A-general; Hf)

623-A. (Book-German.) **Gmelins Handbook of Inorganic Chemistry. Zirconium. 8th Ed. System 42.** 448 p. 1958. Verlag Chemie, GmbH. Weinheim/Bergstrasse, West Germany. $63.84.

Historical review, recovery, properties, applications. (A-general; Zr)

624-A.* **Nickel, Including High-Nickel Alloys.** Albert J. Marron, J. J. Moran, Jr., L. M. Petryck and M. D. Bellware. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1460-1469.

Review of 1957-1958 literature. Metallurgy, application, welding and fabrication. 175 ref. (A-general, 11-54; Ni)

625-A. **Properties and Handling Practices for Magnesium: Literature Survey.** M. Beederman, G. A. Bennett, L. Burris, I. G. Dillon, I. O. Winsch, M. W. Nathans, E. Greenberg and J. Wolkoff. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5749,* Mar. 1958, 132 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.75.

Cost and availability of various grades of high-purity Mg; safety considerations in handling Mg; materials of construction and industrial handling procedures; methods of production and distillation of Mg; physical and thermodynamic properties; survey of binary and ternary alloys. 200 ref.
(A-general; Mg)

626-A.* **The Application of the Discoveries of Nuclear Physics to the Metallurgical Industry of the USSR.** Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 22-48.

Main directions in which the use of radioisotopes and nuclear radiation have been developed are in metallography and physical metallurgy; in the study and control of metallurgical processes such as production of pig iron and steel; and in gamma-radiography for detection of defects and control of technological processes. 89 ref.
(A-general, 1-59; 14-63)

627-A.* (German.) **New Knowledge in the Field of Cast Iron Metallurgy.** W. Herrmann. *Giesserei-Praxis,* no. 16, Aug. 25, 1958, p. 309-310.

Effect of interaction of Fe, C and Si; effect of P and O. Effects of alloying agents on mechanical properties of gray iron. Heat resistant, stress resistant, corrosion resistant and wear resistant cast iron.
(A-general, Q-general, 2-60; CI)

628-A.* **Work Sampling—a Tool for Basic Steel Management.** A. G. Holzman. *Blast Furnace and Steel Plant,* v. 46, Oct. 1958, p. 1070-1074.

Work sampling, also known as ratio-delay study or occurrence study, can be effectively used by basic steel management to obtain reliable information on irregular, noncyclic activities and delays. Computers can be programmed to perform calculations after observations are made. Method was applied to study of three openhearth furnaces during 14 shifts and results compared very well with those of continuous time study over same period. (A5d, D2; ST)

629-A.* **High Strength Steel for Aircraft Applications.** A. J. Lena and E. E. Reynolds. *Blast Furnace and Steel Plant,* v. 46, Oct. 1958, p. 1081-1088.

Including precipitation hardening stainless steels, martensitic hardening stainless steels, cold rolled austenitic stainless steels, hot die toolsteels and superalloys. New methods of evaluation and manufacture. 4 ref. (A-general, T24, 17-57; SS, AY, SGB-a)

630-A.* **Lead as a Corrosion Resistant Material.** *Corrosion Prevention and Control,* v. 5, Sept. 1958, p. 51-52, 54-57.

Extraction and refining techniques; properties and uses of Pb and Pb alloys; effect of alloying additions on mechanical properties; manufactured forms.
(A-general, R-general, 17-57; Pb, SGA-g)

631-A.* **200-Series Stainless Steels.** *Iron Age,* v. 182, Oct. 16, 1958, p. 199-200.

Properties and processes, short-time high-temperature strength, ductility, corrosion resistance, stress cracking, stress-rupture and annealing.
(A-general, Q-general, J23; SS)

632-A.* **Metallurgical Design Considerations for Precipitation-Hardening Steels Up to 1200° F.** F. K. Lampson. *SAE Transactions,* v. 66, 1958, p. 565-573.

Five new alloys—17-7PH, 17-4PH, AM 350, AM 355 and A-286—designed for use up to 1200° F., although long exposure is not feasible above 800° F. Chemistry of each alloy and effect of heat treatment. Although the new alloys are weldable, the metallurgical characteristics must be realized to assure consistent crack-free weldments.
(A-general, 17-51; SS)

633-A.* **Special Alloys Boost Metalworking's Future.** *Steel,* v. 143, Oct. 20, 1958, p. 158-164.

Properties and applications of leaded steels, vacuum melted metals, spring alloys, cast high alloys, Cu alloys, high-temperature alloys, high-strength steels and super-strength steels.
(A-general, Q-general, 17-57; ST, Cu, SS, AY, SGA-h)

634-A.* (French.) **Effects of Intense Radiation From Nuclear Reactors on Materials.** James C. Wilson. *Energie Nucleaire,* v. 2, July-Sept. 1958, p. 207-212.

Examples of known modifications of structure and behavior of irradiated metals; both temporary and long-term changes can occur. Classic testing methods are rejected as invalid for irradiated materials, which undergo such transformations that their properties and the correlations among these properties become those of new and unknown materials. It is suggested that studies of irradiated materials be made at source of radiation (i.e., in the reactor) and during same. 18 ref. (A-general, 2-67)

635-A.* (French.) **Lithium and Its Use.** A. Roos. *Metallurgie et la Construction Mecanique,* v. 90, Sept. 1958, p. 657-663.

Ores and production; Li in the metallurgical industry; Li-Al-Mg alloys. Miscellaneous uses. Vitrifying effect. (A-general; Li)

636-A.* (German.) **Meehanite Cast Iron and Its Significance.** H. Kluge. *Giesserei-Praxis,* v. 18, Sept. 25, 1958, p. 361-365.

Properties: tensile strength, density, hardness, machinability, hardenability, pressure tightness. Major types: general use, heat resistant, wear resistant, corrosion resistant. Tables of mechanical, physical and chemical properties; applications. (A-general, Q-general, 17-57; CI-q)

637-A.* (German.) **Production, Properties and Applications of Super-Pure Aluminum (99.999%).** Hans Schmitt and Walter Koch. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Sept. 1958, p. 427-432.

Production of high-purity Al; disadvantages of graphite electrodes in refining cells; development of cells with metallic terminals. Colorimetric method for determining Si, Cu and Fe in pure Al. Strength, conductivity, corrosion resistance. (A-general, C23, Q-general; Al-a)

638-A.* (Russian.) **Major Iron Ore Deposits in the USSR.** I. S. Shapiro. *Metallurg,* v. 3, Sept. 1958, p. 1-3.

Vast new iron ore deposits uncovered. Resources are estimated at 37 billion tons, or 40% of world resources. Only 15% of ore deposits require no enrichment and these are found in the Krivoirog basin. Their iron content is from 55 to 75%. Deposits in Eastern Siberia have 40% Fe. (A4n; Fe)

639-A. (Rumanian.) **Accomplishments and Prospects of the Mining and Metallurgical Industries of the Rumanian People's Republic.** St. Mantea and Gh. Vanci. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 11-20.

Impressive development of Rumanian industry since second world war, especially during the first 5-year plan, was made possible by development of mining and metallurgy basic industries, by enlargement of the basis of raw materials, by systematic inventory of mineral reserves increased extraction. Production of 1,000,000 tons of briquettes is expected by 1960. Enlargement of plants, development of nuclear industry. (A-general)

640-A. Survey of the Metal Industry. Clement Blazey. *Australasian Engineer,* v. 50, July 7, 1958, p. 48-56.

Technical and economic aspects of metallurgy. 31 ref. (A-general)

641-A. (Russian.) **Origins and First Stages in Development of Blast Furnace Production.** N. I. Krasavtsev. *Metallurg,* v. 3, Aug. 1958, p. 35-37.

Evolution of ironmaking from ancient Chinese practice to 19th Century European developments. (A2, D1; Fe)

642-A. (Slovakian.) **Accident Prevention in Welding.** Pavel Hrbal. *Zvaranie,* v. 7, Aug. 1958, p. 249-251.

(A7p, K-general)

643-A.* Liquefied Petroleum Gases and Their Uses in Metallurgy. C. F. Port. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 363-368.

Properties and specifications of commercial butane and propane; handling and metallurgical applications. (A-general; RM-m)

644-A.* Zirconium. F. G. Cox. *Welding and Metal Fabrication,* v. 26, Oct. 1958, p. 358-365.

Possibilities as a corrosion resistant material for general use in the chemical industry by virtue of its excellent resistance to alkalies—better than that of Ta, Ti and 18-8 stainless steel—and to most acids. For atomic energy purposes, Zr is particularly useful in water-cooled reactors. General properties, working characteristics, machining, welding and corrosion resistance. 14 ref. (A-general; Zr)

645-A. Lead and Its Alloys. Edward J. Mullarkey. *Industrial and*

Engineering Chemistry, v. 50, Sept. 1958, Pt. 2, p. 1449-1454.

New alloys, corrosion applications in electronics, nuclear reactors, leaded steels. 100 ref.
(A-general, 17-57; Pb-b)

646-A. Less Common Metals. E. M. Sherwood. *Industrial and Engineering Chemistry*, v. 50, Sept. 1958, Pt. 2, p. 1455-1459.

Literature review on zirconium, hafnium, molybdenum, columbium, tantalum, chromium and rhenium. 160 ref. (A-general, 10-54; Cb, Cr, Hf, Mo, Re, Ta, Zr)

647-A. Stainless Steels and Other Ferrous Alloys. W. A. Luce. *Industrial and Engineering Chemistry*, v. 50, Sept. 1958, Pt. 2, p. 1482-1488.

Properties of stainless steel, high-Si iron and Fe-Ni alloys. 135 ref. (A-general, Q-general, 11-54; SS, Fe, Ni, Si)

648-A. Titanium. Howard B. Bomberger. *Industrial and Engineering Chemistry*, v. 50, Sept. 1958, Pt. 2, p. 1493-1495.

Literature review covering production, fabrication, properties and applications. 39 ref.
(A-general; Ti)

649-A. (German.) **Depreciation in Foundries.** H. Herrmann. *Giesserei Praxis*, no. 15, Aug. 10, 1958, p. 298-299.

(A4, A5, W19)

650-A. (Russian.) **Application of Radioactive Isotopes to Ferrous Metallurgy.** L. A. Shvartsman. *Zavodskaya Laboratoriya*, v. 24, no. 8, 1958, p. 915-921.

Use in study of nonmetallic inclusions, particularly during melting and pouring of metals. Value of radioactive calcium isotopes as indicators. Application to study process of steel deoxidation and hydrodynamics of slag formation.
(A-general, 1-59; ST, RM-q)

651-A.* Sources of Columbium. Kenneth B. Higbie. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 10-15.

Nature of ore deposits and reserves of columbium-bearing minerals in Africa, Canada, Europe, South America and U. S. 16 ref. (A11a; Cb)

652-A. Urea From Steel Mill By-Products. *Canadian Chemical Processing*, v. 42, Aug. 1958, p. 51-53.

Cyanamid of Canada will take nitrogen, hydrogen and carbon dioxide from Dofasco's steel operations to make ammonia and urea. (A11c)

653-A. Iron Ore and Other Raw Material Sources for a Primary Iron and Steel Industry in Western Canada. T. H. Janes. *Canadian Mining and Metallurgical Bulletin*, v. 51, Sept. 1958, p. 564-573. (Also in *Transactions*, v. 51, 1958, p. 314-323.)

20 ref. (A11a; Fe, RM-n)

654-A. Silicon Steels for Cores. *Iron Age*, v. 182, Oct. 16, 1958, p. 188, 189.

(A-general, P15g, P16s; ST, Si, SGA-n)

655-A. Planned Maintenance Techniques for a Hot Strip Mill. James R. Kennedy. *Iron and Steel Engineer*, v. 35, Oct. 1958, p. 139-144.

Summary of system to replace worn parts before failure; inspect at scheduled intervals, enlist cooperation of workers.
(A5, 18-71, F23, W23c; ST, 4-53)

656-A. Human Temperature Regulation and the Steel Industry. R. F. Hellon. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 197-200.

16 ref. (A7q, D-general; ST)

657-A. Condensed Review of Some Recently Developed Materials. *Machinery*, v. 65, Oct. 1958, p. 131-141.

List of new materials with trade name, properties, applications, manufacturer and address.
(A-general; 11-69)

658-A. Titanium Castings . . . Is the Time Ripe? John H. Garret and Franklin P. Huddle. *Modern Castings*, v. 34, Aug. 1958, p. 18-21.

(A4p, Ti, 5-60, 17-57)

659-A. Estimating Electroplating Costs. Frank Spicer. *Product Finishing*, v. 11, Oct. 1958, p. 64-69.

A resume of a meeting by the National Association of Metal Finishers of America. Pricing the plating of a bracket, channel of rolled steel, brass tube.
(A4s, L17; ST, Cu-n, 17-53)

660-A. Effects of Uranium Ore Refinery Wastes on Receiving Waters. E. C. Tsivoglou, A. F. Bartsch, D. E. Rushing and D. A. Holaday. *Sewage and Industrial Wastes*, v. 30, Aug. 1958, p. 1012-1027.

12 ref. (A8c; U)

661-A. Metal Selector, 1958 Edition. *Steel,* v. 143, Oct. 20, 1958, p. 165-180.

Tables of chemical composition ranges and limits, properties and typical uses, corrosion and heat resistance of leaded steels, vacuum melted metals, spring alloys, cast high alloys, Cu alloys, high-temperature alloys, high-strength steels and super-strength steels.
(A-general, 17-57; ST, Cu-b)

662-A. Titanium. John W. Stamper. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 18 p.

Review of production, stockpiles, technology. 45 ref. (A4; Ti)

663-A. (Dutch.) **Uses of Nickel-Rich Alloys.** C. Vollers. *Metalen,* v. 13, Aug. 15, 1958, p. 280-281.

(A-general, 17-57; Ni-b)

664-A. (French.) **Niobium and Tantalum, Metals of the Future.** *Echo des Mines et de la Metallurgie,* no. 3519, Aug. 1958, p. 495-497.

(A-general; Cb, Ta)

665-A. (German.) **Regeneration of Sulphuric Acid in Wire Pickling.** Werner Mallach. *Draht,* v. 9, Sept. 1958, p. 335-342.

Mathematical considerations for a simulated system where the regenerating plant is interpolated in the acid circuit. Chemical reactions occurring in pickling; change in density of water-dissolved H_2SO_4 in service; its thermal behavior; solubility of iron sulphate. In the regeneration process, $FeSO_4$ is precipitated by cooling.
(A8b, L12g; 4-61)

666-A. (German.) **Air Contamination and Dust Removal in a Foundry.** Antonio Riggi. *Giesserei,* v. 45, Sept. 11, 1958, p. 575-582.

(A8a, W19)

667-A. (German.) **Use of Blast Furnace Gas in the Synthesis of Hydrocarbons.** Herbert Kolbel. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1165-1169.

Synthesis of hydrocarbons from blast furnace gas and steam.
(A11e, A8a; RM-m39)

668-A. (German.) **Reduction of Iron in an Ancient Bloomery.** Eberhard Schurmann. *Stahl und Eisen,* v. 78, Sept. 18, 1958, p. 1297-1308.

Research on the reduction process of the old-time bloomery hearths, based on analysis of slag found.
(A2, D-general; Fe, RM-q)

669-A.* The U. S. Position as to Resources for the High-Temperature Metals. Richard M. Foose. *SRI Journal,* v. 2, no. 2, 1958, p. 56-63.

The principal candidates for high-temperature service either alone or as alloys are Cb, Ta, Mo, W and Cr. Only with Mo is the United States in a comfortable position. Location of major deposits of each metal; applications. (A-general; SGA-h, Cb, Ta, Mo, W, Cr)

670-A.* (German.) **Precious Metals in Research and Industry.** H. Wolf. *Metall,* v. 12, July 1958, p. 585-593.

Extensive literature survey for last six years on basic chemistry, application of precious metals as tracers and in diffusion studies. Cohesion and vapor pressures as well as electrical properties have enlarged the field considerably. A great number of binary systems with Ag and Pt investigated. Metals like Os, In, Ru, Rh and Pd are advancing and have some advantages over Au, Ag and Pt. 276 ref. (A-general; EG-c31)

671-A.* Removal of Corrosion Products From High Temperature, High Purity Water Systems With an Axial Bed Filter. R. E. Larson and S. L. Williams. *Corrosion,* v. 14, Sept. 1958, p. 44-48.

Concentration of corrosion products and other impurities which produce radionuclides must be maintained at a minimum in the primary coolant systems of nuclear power plants. While resin exchangers remove corrosion products and their radioactive nuclides, high unit cost of resin and the need for large heat exchange unit makes high-temperature purification with low-cost media attractive. Axial bed filter charged with low-cost magnetic iron oxide shows thermal stability and is highly effective. 5 ref. (A8d, W11p, R10g)

672-A. Design and Operation of Hanford's Plutonium Metallurgy Facilities. O. J. Wick and I. D. Thomas. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1903, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Complete containment within glove boxes is adhered to throughout the entire fabrication process.
(A7r, 17-51; Pu)

673-A.* (French.) **Study of Foundry Production Planning.** Rene Sauquet.

Fonderie, no. 150, July 1958, p. 305-318.

Twenty-eight habitually encountered weaknesses in both office and shop; corrective measures. Considerations are customer satisfaction with delivery, price and quality and efficient plant operation permitting fair profit to be realized on each order. Charts and graphs show suggested handling of orders from moment of receipt until delivery of product. (A5, E-general)

674-A.* (French.) **Accident Prevention in Foundries.** J. Leonard. *Fonderie Belge*, v. 28, Aug. 1958, p. 249-250.

Introduction to statistical study to be presented in eight instalments; figures on accident frequency in Belgian foundries and safety standing as compared to other industries. (A7p, E-general)

675-A.* (Italian.) **Manganese. Pt. 2.** Andrea Ciaccio and Mario L. Savarese. *Industria Mineraria*, v. 9, 2nd Series, June 1958, p. 343-351.

Role of Mn in steelmaking; production of carburized ferromanganese in blast furnaces and electric furnaces; methods of producing low carbon ferromanganese and silicomanganese. Processes used in manufacture of commercially pure Mn. Cost factors in production of various types of ferro-alloys containing Mn and of metallic Mn. Figures on Italian production, importation and export of Mn ores and materials from 1942 through 1957. 19 ref.
(A-general; Mn, AD-n31)

676-A.* (Italian.) **Plastic Working of Sheet Steel. Pt. 1. The Material.** Riccardo Levi. *Rivista di Meccanica*, v. 9, June 21, 1958, p. 51-57.

Metallurgy of steel for presswork applications, rimmed, killed and semikilled steels; normalizing and annealing of sheet product for subsequent plastic working; finish rolling; aging; storing and handling of stock; flatness; dimensional tolerances. (To be continued.)
(A-general, F23, J23; ST, 4-53)

677-A.* Columbium (Niobium) and Tantalum. Pt. 1, General Metallurgy, Occurrences and Uses. D. R. Williamson and Lorraine Burgin. *Colorado School of Mines Mineral Industries Bulletin*, v. 1, Sept. 1958, 12 p.

Composition and distribution of rocks containing Cb and Ta minerals. Concentration methods, processors, prices, metal production and refining, physical properties and uses. 114 ref.
(A11a, A4, C-general; 17-57, Cb, Ta)

678-A.* Two New 1800° F. Alloys for Cast Turbine Blades: Nicrotung, J. T. Brown. DCM Alloy. J. E. Wilson. *Metal Progress*, v. 79, Nov. 1958, p. 83-87.

Both are nickel-base alloys and contain about 4% Al and 3½ to 4% Ti; Nicrotung contains 12% Cr, 10% Co, 8% W, plus B and Zr; DCM has 14 to 16% Cr, about 5% each of Mo and Fe, plus B and Cu. Both are designed for high stress-rupture strength. (A-general, Q-general, 2-62, T7h, 17057; Ni-b, SGA-h)

679-A.* (English.) **Spheroidal Graphite Cast Iron.** *Metalen*, v. 13, May 20, 1958, p. 92-97.

Structural characteristics, mechanical properties, physical properties, resistance to wear, heat and corrosion of spheroidal graphite cast irons in the as-cast or annealed condition. Properties and production characteristics compared with flake graphite irons. (A-general; CI-r)

680-A. Safe Handling of Sodium in Titanium Production. Ted F. Meinhold and Jack Winterhaler. *Chemical Processing*, v. 21, Sept. 1958, p. 76-80.

(A7, C1g; Ti, Na)

681-A. Disposal of Radioactive Wastes from the Uranium Ore Refining Industry. E. C. Tsivoglou. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/2359, 1958, 12 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Course of radioactive materials, particularly radium, through the refining process in a resin-in-pulp U recovery plant. (A8c, C19a; U)

682-A. A Survey of the Iron Ore Industry in Canada During 1957. T. H. Janes and R. B. Elver. *Department of Mines and Technical Surveys, Ottawa, Canada, Mineral Information Bulletin MR 27*, June 1958, 116 p. $.25.

(A4; Fe, RM-n, 10-54)

683-A. Studying a Dangerous Metal. T. Raine and P. P. Starling. *Engineer and Foundryman*, v. 24, Aug. 1958, p. 55-58.

Safety precautions taken, special construction required, for Be development installation. (A7; Be)

684-A. Review of the Steel Plants. Sri Sardar Swaran Singh. *Indian and Eastern Engineer,* v. 123, July 1958, p. 7-10.

Status of Indian iron and steel industry. (A-general; ST)

685-A. High-Performance Steels. Edward A. Loria. *Machine Design,* v. 30, Sept. 4, 1958, p. 111-115.

Factors determining optimum performance include type of microstructure, heat treatment, hardenability and alloy composition. 4 ref. (A-general; ST)

686-A. Design of a Beryllium Laboratory. T. Raine and P. P. Starling. *Metropolitan-Vickers Gazette,* v. 29, Aug. 1958, p. 222-226.

Precautions taken to protect against toxicity. (A7r; Be)

687-A. Iron Ore in Canada. A. Hopkins. *Mine and Quarry Engineering,* v. 24, Oct. 1958, p. 459-464.

Deposits, production figures, future expansion. (A11a; Fe, 14-59)

688-A. Potential Tonnages of the Center Iron Sandstone in Perry County, Pa. Frank M. Swartz and Harvey J. Hambleton. *Mineral Industries Experiment Station, Bulletin,* no. 71, July 1958, p. 19-27.

7 ref. (A11a; Fe, RM-n)

689-A. New Metals in the Oil Industry. Pt. 2. Tantalum and Niobium. W. H. L. Hooper. *Petroleum,* v. 21, Sept. 1958, p. 313-315.

Physical and mechanical properties; welding and forming; typical applications.
(A-general, T28, 17-57; Ta, Cb)

690-A. A Note on Transition Metal Alloys. C. W. Haworth and W. Hume-Rothery. *Philosophical Magazine,* v. 3, Sept. 1958, p. 1013-1019.

Composition limits of possible alloys of Cr, Mo, and V with Mn, Fe, Co, Ni, Tc, Ru, Rh, Pd, Re, Os, Ir, Pt. 7 ref. (A-general; Cr, Mo, V)

691-A. Beryllium for Structural Applications: a Review of the Unclassified Literature. W. Hodge. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121648, Aug. 1958, 182 p. $3.

(A-general, 10-52; Be)

692-A. Gadolinium and Europium Alloys—Their Preparation. Melting and Properties. M. L. Wright, F. E. Block and H. Kato. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/696, 1958, 15 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Gd and Eu have high thermal neutron absorption properties. Extremely small quantities of these rare earth metals, when alloyed with Zr, Ti or stainless steel may be useful in the control of atomic power reactions. Alloys evaluated by metallography, corrosion testing in hot pressurized water and physical tests. 6 ref.
(A-general, P18; Gd, Eu, Zr, Ti, SS)

693-A. Zirconium Raw-Material Supply. F. W. Wessel. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1772, 1958, 9 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.), $.50.

Zircon reserves; extraction and refining techniques. 8 ref.
(A11a, C-general; Zr)

694-A. Economic Aspects and the Supply Situation for Columbium. Ronald L. Carmichael. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 16-19.

(A4n; Cb)

695-A. Dust Precipitation by Sonic and Ultrasonic Vibrations. A. Willner. *Bergbau-Technik,* v. 5, no. 4, 1955, p. 201-209. (Henry Brutcher, Altadena, Calif., Translation no. 4404.)

Survey of present status of precipitation of fine dust by acoustic means. Theory of agglomeration of dust by ultrasound.
(A8a, W13c; 1-74)

696-A. (French.) **Copper in the Middle Ages. Products of the Dinant (Belgium) Artisans.** R. Vaultier. *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 30-32.

(A2; Cu)

697-A. (German.) **Comparative Economics in the Iron and Steel Industry.** Gerhard Winkler. *Neue Hütte,* v. 3, Sept. 1958, p. 543-549.

Economy of the rotary furnace and low-shaft furnace compared. East German iron and steel economy. 17 ref. (A4, D8n; ST)

698-A. (German.) **Utilization of the Waste Heat of a Pusher Furnace Heated With Blast Furnace Gas.**

Hans Weineck. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1246-1251.

Besides the usual air and gas recuperators, a plant for heating with circulating water is added. So, waste gas of less than 300° C. is utilized. (A11e, W17g)

699-A. (German.) **Fifty Years Verlag Stahleisen.** *Stahl und Eisen,* v. 78, Oct. 2, 1958, p. 1361-1364.

(A2; ST)

700-A. (German.) **Steel Defects and Their Causes.** *Technik und Betrieb,* v. 10, July 1958, p. 101-102.

Significance of the upper conversion point in the formation of coarse grain. Reasons for poor wear resistance, corrosion, corrosion fatigue, cavities, surface defects, flaws, hot shortness, scaly surface, band structure. (A-general; ST, 9)

701-A. (German.) **Cost Calculation for Machine Tools.** C. M. Dolezalek. *Werkstattstechnik und Maschinenbau,* v. 48, Sept. 1958, p. 493-496.

(A5f, W25)

702-A. (Polish.) **Prospects of Metallurgical Industry Expansion in Poland Between 1960 and 1975.** Aloyzy Farnik, *Hutnik,* v. 25, No. 6, June 1958, p. 211-216.

Increase of steel production after World War II. Justification and rate of steel production growth. Importance of steel in economical progress of the nations and the world. Possibilities of substitutes for steel. Progress of world production of steel. Steel demand in Poland. Sources of raw materials and their procurement. Present and future trend of steel products manufacture according to their end use. Investment and productivity in metallurgical industry. Import and export of raw materials and Polish steel products. 8 ref. (A4, A11a; ST)

703-A. (Russian.) **Work of the Steelmaking Section of Permanent Commission of Council for Mutual Economic Assistance.** M. A. Pertsev and D. A. Smolyarenko. *Stal',* v. 18, Sept. 1958, p. 793-796.

Conference in Dnetropetrovsk of representatives from Hungary, East Germany, Roumania, Poland and Czechoslovakia which set forth goals for increased steel production for 1958-1960 and 1960-1975. The gathering considered cooperative efforts towards improving quality, better refractory material, and special attention to production of ball-bearing steels. (A-general, A4p; ST)

704-A. (Book.) **Fourth National Symposium on Vacuum Technology, Transactions.** Wilfred G. Matheson. 176 p. 1958. Pergamon Press, 122 E. 55th St., New York 22, N. Y. $12.50.

Fundamental developments of vacuum technology and engineering: new methods and techniques, obtaining high vacuum, instrumentation, controls and other vacuum devices. Production and properties of metals and alloy films. Application of techniques in industry and research. Papers abstracted separately. (A-general, 1-73)

705-A. (Book.) **Physical Metallurgy of Uranium.** A. N. Holden. 262 p. 1958. Addison-Wesley Publishing Co., Inc., Reading, Mass. $10.75.

History, occurrence and preparation; radioactivity and nuclear reactions; crystallography; physical and chemical properties; mechanical properties; deformation; recovery, recrystallization and grain growth; transformations in U and U alloys; growth of single crystals; diffusion in U systems; radiation damage; thermal-cycling growth; design of metallic fuel elements; metallography of U. (A-general; U)

706-A. (Book.) **Technology of Columbium (Niobium).** B. W. Gonser and E. M. Sherwood. 120 p. 1958. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

Papers presented at symposium arranged by Electrochemical Society, May 1958, considering sources and supply of Cb, extractive methods, impurity analysis, mechanical properties, effect of alloy additions, physical metallurgy and oxidation resistance. Papers abstracted separately. (A-general; Cb)

707-A. (Book.) **Thorium Production Technology.** F. L. Cuthbert. 303 p. 1958. Addison-Wesley Publishing Co., Inc., Reading, Mass. $6.50.

Uses, physical and chemical properties of Th metal and compounds; Th-bearing ores and their concentration; various steps for extracting and purifying the ore and reducing it to the metal; methods for casting and fabrication; health and safety aspects of Th production; chemical and physical methods of testing. 41 ref. (A-general; Th)

708-A. (Book-English.) **English-French and French-English Technical Dictionary.** F. Cusset. 663 p. 1957. Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. $8.

Covers fields of metallurgy, mining, electricity, chemistry, mechanics and sciences. (A-general, 11-67)

709-A. (Book-Russian.) **Metallurgy of the Rare Metals.** I. P. Kislyakov. 232 p. 1957. Metallurgizdat, Moscow, USSR. 6R 40K.

Metallurgy of tungsten, molybdenum, columbium, tantalum, vanadium, titanium, zirconium, thorium and rare earths, uranium, gallium, indium, thallium, germanium, hafnium, rhenium, beryllium, lithium. 159 ref. (A-general; EG-b)

710-A. (Book-Russian.) **Structure and Properties of Aluminum Alloy Extrusions and Stampings.** S. M. Voronov. 248 p. Moskovskii Aviatsionny Tekhnologicheskii Institut, Moscow, USSR.

24 ref. (A-general; Al-b, 4-58, 4-59)

711-A Safety in the Foundry. H. P. Millar. *British Foundryman,* v. 51, Aug. 1958, p. 374-384.

7 ref. (A7p, E-general)

712-A. Iron and Phosphate Slag From Byproduct Ferrophosphorus. J. M. Potts, W. C. Scott, Jr., J. U. Campbell and J. A. Wilbanks. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 148-151.

Smelting process and furnace developed for converting ferrophosphorus. 6 ref.
(A11d, A11c, D2a; Fe, RM-q, AD-m31, P)

713-A. Metallurgical Education in the USSR. John Chipman and Nicholas J. Grant. *Journal of Metals,* v. 10, Mar. 1958, p. 169-172.
(A3)

714-A. Non-Ferrous Metallurgical Training. David Swan. *Journal of Metals,* v. 10, Mar. 1958, p. 173.

Comments on the Kalinin Institute for Non-Ferrous Metals in Moscow. (A3g; EG-a38)

715-A. Quantity and Quality in Russian Metallurgical Education. Walter R. Hibbard, Jr. *Journal of Metals,* v. 10, Mar. 1958, p. 174.
(A3g)

716-A. Metallurgical Research in the USSR. J. H. Hollomon and W. R. Hibbard, Jr. *Journal of Metals,* v. 10, Mar. 1958, p. 176-178.

Size, intensity and fields of concentration of Soviet effort.
(A-general)

717-A. New Metals Face the Future. C. M. Brown and R. W. Fountain. *Journal of Metals,* v. 10, May 1958, p. 330-334.

Survey of heat resistant metals: Cb, W, Ti, V, Zr, Mo, Ta. Tungsten-base alloys for service up to 3400° F. predicted. (A-general; Cb, Mo, Ta, Ti, V, W, Zr, EG-d37, SGA-h)

718-A. Refractory Metals: Tungsten, Tantalum, Columbium, and Rhenium. J. W. Pugh. *Journal of Metals,* v. 10, May 1958, p. 335-339.

Anayses with respect to high-temperature applications. 35 ref.
(A-general; Cb, Ta, Re, W, EG-d37, SGA-h, 17-57)

719-A. Columbium Primer. Chester T. Sims. *Journal of Metals,* v. 10, May 1958, p. 340-345.

21 ref. (A-general; Cb)

720-A. Beryllium—Present and Potential Uses. Lawrence F. Boland. *Journal of Metals,* v. 10, June 1958, p. 401-403.

Applications reviewed with reference to cost, availability, brittleness and toxicity. (A-general; Be, 17-57)

721-A. High-Temperature Alloys: 1900-1958. F. S. Bodger. *Journal of Metals,* v. 10, Aug. 1958, p. 512-516.

Application, fabrication, research. 5 ref. (A2; SGA-h)

722-A. Ductile Vanadium—a New Engineering Material. T. W. Merrill. *Journal of Metals,* v. 10, Sept. 1958, p. 618-621.

Production, reduction, refining, fabrication, properties.
(A-general, Q-general; V)

723-A. Belgium's Metallurgical Research Center. Pierre Coheur and J. Zaeytydt. *Journal of Metals,* v. 10, Oct. 1958, p. 656-658.

Activities of the Centre National de Recherches Metallurgiques - CNRM. (A-general, A9h)

724-A. Education in Process Metallurgy. W. O. Philbrook. *Journal of Metals,* v. 10, Oct. 1958, p. 679-681.

Optimum requirements in relation to limitations of four-year curriculum. (A3)

725-A. Beryllium. Its Problems and Possibilities. Joseph R. Lane. *Journal of Metals,* v. 10, Nov. 1958, p. 738-742.

Availability; ductility and brittleness; health hazards; fabrication procedures; applications.
(A-general, Q-general; Be, 17-57)

726-A. Electric-Furnace Ferro-Alloy Industry in America. J. H. Brennan, H. D. Dunn and C. M. Cosman. *Journal of Metals,* v. 10, Dec. 1958, p. 785-789.

Activities of ten major companies reviewed. (A-general, D-general; Fe, Mn, AD-n31)

727-A. Manganese and Chrome Ore Outlook. John M. Warde and Eileen P. Burke. *Journal of Metals,* v. 10, Dec. 1958, p. 790-795.

Production statistics balanced against future demands. (A4p; Mn, Cr, RM-n)

728-A. Columbium-Treated Steels, Low-Cost, High Strength. F. Weston Starratt. *Journal of Metals,* v. 10, Dec. 1958, p. 799.

Additions of 0.01 to 0.036% Cb change the solidification mechanism of mild-carbon steels to produce a fine-grained structure, characteristic of tough, high-strength steels, previously produced by costly heat treatment or alloy additions. (A-general, M27, 2-60, 2-64; CN, Cb)

729-A. Nuclear Metals Opens New Laboratory. *Journal of Metals,* v. 10, Dec. 1958, p. 803.

Current research activities. (A9h, T11g)

SECTION B

RAW MATERIALS and ORE PREPARATION

1-B. Some General Chemical Principles in Extraction of Metals From Low-Grade Ores. A. J. E. Welch. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 1-14.

Review of a number of recent processes in which chemical concentration methods are predominantly applied to low-grade ores; general pattern of such processes; unit-process steps needing more fundamental study. 24 ref.
(B14, C19; RM-n)

2-B. Chemical and Physical Concentration of Uranium Ores. S. W. F. Patching. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 107-118.

22 ref. (B13, B14; U, RM-n)

3-B. Pilot Plant Concentration of Mindola Uranium Ore. M. L. Fitzgerald and D. F. Kelsall. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 163-174.

Removal of carbonates by a straight grinding and flotation circuit, with provision for the incorporation of gravity scalping.
(B13, B14h; U, RM-n)

4-B. Flotation of Vanadium Ore From the Abenab West Mine of the South West Africa Co. M. G. Fleming. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 212-257. (CMA)

The ores are vanadinite and descloizite in a gangue of ferruginous clay, iron oxides, dolomite, calcite and quartz; 40% is finer than 200 mesh. Xanthates were chosen as collectors. Xanthate concentration, relative flotability of minerals, and sodium carbonate concentration.
(B14h, V, RM-n)

5-B. (Russian.) **Automation of Several Aggregates in a Sintering Plant.** I. M. Ravikovich. *Stal'*, v. 17, May 1957, p. 385-388. (Translation in *Iron and Coal Trades Review*, v. 175, Aug. 9, 1957, p. 323-325.)

Automation assures even distribution of the charge among the various units while constant height of the burden is maintained. If the chute clogs or belt breaks the conveyor is stopped and a device protects the conveyor belt from hot returns.
(B16a, 1-52, W12r; Fe, RM-n)

6-B. (Russian.) **Treatment of High-Silicon Ores in Rotary Kilns.** V. Kyuncher and I. Shleier. *Stal'*, v. 17, May 1957, p. 392-401.

Low-grade acidic ores may be treated more economically in rotary kilns than by roasting-magnetic or wet mechanical methods of beneficiation; ores with a definite free silica content can be worked at a lower cost than in low-stack furnaces. 5 ref.
(B15, W15a, 1-52; Fe, *Si*, RM-n)

7-B. (Russian.) **Effect of Mineralogical Composition of Molybdenum Concentrates on the Roasting Process.** T. P. Khazanova, N. P. Lyakishev and E. A. Grishankova. *Stal'*, v. 17, May 1957, p. 425-429.

It is expedient to add missing mineralogical constituents to molybdenum concentrates to bring them up to standard requirements for obtaining uniform results in roasting. The minerals considered are calcite, chalcopyrite, quartz, galena, feldspar, hematite.
(B15; Mo, RM-n, NM-e)

8-B. Dry Magnetic Concentration. P. E. Cavanagh and E. W. Williams. *Canadian Mining and Metallurgical Bulletin,* v. 50, Sept. 1957, p. 558-564. (Also, *Transactions,* v. 50, 1957, p. 326-332.)

Results of pilot-plant study on concentration of magnetite iron ore in a dry state by means of magnetic concentrators. (B14j; Fe, RM-n)

9-B. Exploration and Development of the Sedimentary Iron Ores of Missouri. William C. Hayes. *Information Circular No. 14.* State of Missouri, Dept. of Business and Administration, Division of Geological Survey and Water Resources. 1957, p. 1-33.

15 ref. (B general; Fe, RM-n)

10-B. Lime Addition and Pulp Consistency in Gold Ore Milling. G. Chad Norris. *Institution of Mining and Metallurgy, Bulletin,* no. 610, Sept. 1957, p. 597-611.

Addition of lime to process in form of milk-of-lime prepared by slaking quicklime with excess water resulted in more efficient use of lime and smoother ball-mill and classifier operation than intermittent addition of lime as quicklime ahead of grinding mills. Milk-of-lime additions are preferably made at several points in process, each appropriate to next stage, in ore treatment. 9 ref. (B13c; Au, RM-8)

11-B. Uranium Ore Processing. Richard H. Kennedy. *Mines Magazine,* v. 47, Sept. 1957, p. 22-25, 38.

(B14; U, RM-n)

12-B. Consolidated Denison Mines, Ltd. *Mines Magazine,* v. 47, Sept. 1957, p. 63-64.

Uranium mining at Quirke Lake, Northern Ontario. (B12; U)

13-B. Innovations in Processing Uranium Ores. J. B. Rosenbaum, W. L. Lennemann and J. B. Clemmer. *Mining Engineering,* v. 9, Sept. 1957, p. 976-981.

Beneficiation by attrition grinding and lime flotation. Flow sheets on U extraction, including solvent extraction of sulphuric acid eluate, char-in-pulp system, pressure oxidation leaching, hydrogen precipitation from soda ash solution, thick slurry solvent extraction, ammonium carbonate leaching and nonaqueous extraction. 6 ref. (B13, B14, C19; U, RM-n)

14-B. (German.) **Application of New Flocculants for the Improvement of the Clarification and Filtering of German Ores.** Martin Clement. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Sept. 1957, p. 421-427.

Besides organic and inorganic electrolytes, highly polymeric substances such as Separan, Aerofloc and DT 120 were found to be advantageous for clarifying and filtering ores as well as for faster coagulation and sedimentation. 12 ref. (B14q; RM-n)

15-B. (German.) **Agglomeration of Iron Ore Fines in Vacuum Extrusion Presses.** Manfred Häuser. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Sept. 1957, p. 443-450.

A series of experiments were carried out on a particularly difficult bog iron ore, with the object of obtaining satisfactory lump sizes. Various additions such as cement, limestone and coke breeze were tested. (B14; Fe, RM-n)

16-B. Portfolio of Flowsheets. *Canadian Mining Manual,* 1957, p. 149-207.

Flowsheets covering Au, Ag, Ag-C, Fe ore, base metals, U processes at various Canadian mines. (B13, B14, B15)

17-B. Selected Annotated Bibliography of Thorium and Rare-Earth Deposits in the United States Including Alaska. K. L. Buck. *U. S. Atomic Energy Commission,* GSB-1019-F, 1957, 28 p. (CMA)

(B general; Th, EG-g)

18-B. Concentration of Beach Sand Minerals From Ballina, N. S. W. S. G. Hudson. *Australia. Commonwealth Scientific and Industrial Research Organization. Ore-Dressing Investigations with Mining Department, University of Melbourne, Report 526,* Mar. 1957, 9 p. (CMA)

(B14; Ti)

19-B. (German.) **Production of Burden Briquettes Without Binders From Ore, Brown Coal or Basic Fluxes.** Wilhelm Petersen and Siegfried Wawroschek. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1427-1435.

Economic importance and state of development of low-temperature smelting. 18 ref. (B16d, C21; RM-j, RM-h, RM-q)

20-B. (Rumanian.) **Extraction of Titanium Dioxide From Red Sludges Remaining From the Manufacture of Aluminum.** C. G. Macarovici, L. Czeglady, H. Roth and I. Soos. *Studii si Cercetari Stiintifice, Seria 1. Stiinte Matematice, Fizice, Chimice si Teh-*

nice, v. 6, July-Dec. 1955, p. 87-109. (CMA)

The best yields (60-70%) of a product containing 80% TiO_2 were obtained by the hydrolytical treatment of sludges with a mixture of $HClO_4$ and HCl. 122 ref. (B14; Ti)

21-B. (Russian.) **Melting Point of Molybdenite.** A. N. Zelikman and L. V. Belyaevskaya. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 10, Oct. 1956, p. 2239-2244. (CMA)

4 ref. (B general, P12n; Mo)

22-B. (Russian.) **Study of the Reaction of Oxidation of Molybdenite.** A. N. Zelikman and L. V. Belyaevskaya. *Zhurnal Neorganicheskoi Khimii,* v. 1, Oct. 1956, p. 2245-2256. (CMA)

Concentrates of molybdenum ores prepared by oxidizing molybdenite (MoS_2) to molybdenum trioxide (MoS_3). 4 ref. (B14; Mo)

23-B. (Pamphlet.) **Some Investigations on the Preparation and Properties of Metallic Slurry Systems With Particular Reference to Particle Behavior.** G. W. Greenwood and B. Sharpe. Atomic Energy Research Establishment M/R 2250, 1957, 28 p. 5 sh.

34 ref. (B14)

24-B.* Sintering of Hematite Ore Lines. Practice at the Iscor Works, Pretoria. E. Kleen. *Iron and Coal Trades Review,* v. 175, Sept. 6, 1957, p. 549-552.

Experiments in pilot plant and results obtained with Dwight Lloyd equipment. (B16a, 1-52; Fe, RM-n)

25-B. (German.) **Procedures in Ore Preparation. Pt. IV. Flotation Practice.** Georg Grave. *Chemie für Labor und Betrieb,* v. 8, Sept. 1957, p. 371-379.

Laboratory studies. 8 ref. (B14h)

26-B.* Sinter-Bed Ignition. H. Bates. *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 310-314.

Variables affecting sinter-bed ignition and hence the strength of the sinter from the top layer of the bed. There is an optimum rate of heat input and percentage of excess air for ignition and an increase in the moisture content or the particle size of the top of the bed results in a decrease in the sinter strength. A total heat input of 4000 Btu. per sq. ft. was found to be sufficient for both the lean home and rich foreign ore mixes used. (B16a; Fe, RM-n)

27-B. (English.) **Treatment of Complex Sulphide Ores From Yonaihata Mine, Fukushima Prefecture. Pt. I. Occurrence and Nature of the Ore.** Tsunehiko Takeuchi and Kazunori Gondo. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 434-445.

8 ref. (B general, RM-n)

28-B. (English.) **Treatment of Complex Sulphide Ores From Yonaihata Mine, Fukushima Prefecture. Pt. II. Flotation.** Tsunehiko Takeuchi and Kazunori Gondo. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 446-457.

3 ref. (B14; RM-n)

29-B.* Niobium. Pt. 1. Occurrence, Extraction and Refining. J. H. Rendall. *Metal Treatment and Drop Forging,* v. 24, Dec. 1957, p. 491-494.

Extraction of Cb from its ores; reduction to Cb powder; sintering process; welding and brazing. 14 ref. (B general, C general, H general, K general)

30-B. Hardening of Iron-Ore Pellets. B. Sewerynski and T. Wlazinska. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, 1955, p. 30-34. (Henry Brutcher Translation no. 3706, Altadena, Calif.)

Previously abstracted from original. See item 84-B, 1955. (B16b, 1-52; Fe; RM-n)

31-B. Pelletizing of Iron Ores. Z. Krótkiewski and B. Sewerynski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, 1955, p. 101-105. (Henry Brutcher Translation no. 3707, Altadena, Calif.)

(B16b, 1-52; Fe; RM-n)

32-B.* (Spanish.) **Production of Metallic Magnesium in Argentina. Study of Preliminary Treatment of San Juan Dolomites for Production of Metallic Magnesium.** Federico Carnevale. *Sociedad Cientifica Argentina, Anales,* v. 154, July-Aug. 1957, p. 27-39.

Pretreatment of Mg ores from one of the largest known deposits in Argentina; composition of ores, availability of process materials, electric power and influence of other factors on processes employed. (B general; Mg, RM-n)

33-B.* Milling Practice at the Lavender Pit Concentrator. H. K. Martin. *Mining Engineering,* v. 9, Nov. 1957, p. 1229-1235.

Flow sheet and description of primary and secondary crushing, primary grinding, flotation and classification operations and tailing disposal in treating low-grade porphyry copper ore. (B13, B14; Cu)

34-B.* L-P-F Treatment of Ray Ore. A. W. Last, J. L. Stevens and L. Eaton, Jr. *Mining Engineering,* v. 9, Nov. 1957, p. 1236-1238.

Flow sheets and description of result obtained in treatment of a copper ore by sulphuric acid leaching, precipitation of dissolved Cu and recovery by flotation. Studies made on laboratory and pilot plant scales. (B14h; Cu, RM-n)

35-B. Grinding Practice at Tennessee Copper Co.'s Isabella Mill. F. M. Lewis and J. E. Goodman. *Mining Engineering,* v. 9, *Transactions AIME,* v. 209, Nov. 1957, p. 1253-1255.

Data on power requirements and output show that larger slow-speed underloaded ball mill and hydraulic classifier are more efficient than small high-speed normally loaded ball mill and rake classifier. (B13c, W15n; Cu)

36-B. Production of Blast Furnace Coke at High Coking Rate. Emmett A. Brady. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 54-59.

Raw materials, facilities and operating practice at Cleveland Coke and Coal Chemical Works, U. S. Steel Corp., Cleveland, Ohio. (B18n; RM-j43)

37-B. Sinter-Plant Assessment Trials at John Summers and Sons, Ltd., Shotton. H. Bates, G. C. Carter and D. F. Ball. *Iron and Steel Institute,* v. 188, Jan. 1958, p. 45-54.

Leakage of air between the strand and the fan was measured. Performance of the sinter cooler. (B16a; Fe)

38-B. Paris Sintering Conference. A Summary. J. Astier. *Journal of Metals,* v. 9, Oct. 1957, p. 1363-1364.

Summarizes symposium on iron ore sintering with note on mechanism of sintering, sinter quality, plant operation and effect on blast furnace operation. (B16, D1a; Fe)

39-B.* Castable Refractories. A. E. Williams. *Metal Industry,* v. 92, Jan. 3, 1958, p. 3-7.

Properties and applications of aluminous cement; difference in composition from conventional cement bestows on the aluminous cement a normal setting time followed by rapid hardening, a high resistance to chemical attack and to elevated temperatures, which latter property makes it suitable for use as a bond for refractory aggregates, to withstand temperatures up to 1800° C. (B19; RM-h)

40-B. Ferromanganese From Lean Ore. B. R. Nijhawan. *Metal Progress,* v. 73, Jan. 1958, p. 112-116.

India has exported about 1,000,000 tons of hand-picked high-grade manganese ore annually, but its large resources in low-grade ore could, when concentrated and smelted, be sold as standard ferromanganese and the value doubled. Numerous projects of this sort are in pilot plant or small production. (B14, C21, 2-60; Fe, Mn, AD-n)

41-B. Manitoba Pushes Ahead on New Major Nickel Source. Henning Nielsen. *Mining Engineering,* v. 9, Dec. 1957, p. 1321-1323.

(B general, A11a; Ni)

42-B. Grinding Magnetic Taconite in Rod Mills. E. M. Furness and A. S. Henderson. *Mining Engineering,* v. 9, *Transactions AIME,* v. 209, Dec. 1957, p. 1359-1360.

(B13; Fe)

43-B. Agglomeration and Flotation of Manganese Ore. Ellis H. Gates. *Mining Engineering,* v. 9, *AIME Transactions,* v. 209, Dec. 1957, p. 1368-1372.

8 ref. (B14h; Mn, RM-n)

44-B. (French.) **Results of Creep Tests of the Pilings of Cowpers.** J. Baron. *Institut de Recherches de la Siderurgie, Publications,* Series A, no. 131, Feb. 1957, p. 78-87.

Creep tests give good indications on the resistance of refractories loaded at high temperatures. The hypotheses made by Dale are confirmed. The most important factor is the structure of the material. (B19d, W17m)

45-B. (Czech.) **Metallurgical Characteristics and Classification of Iron Ores.** Miroslav Prouza. *Hutnické Listy,* v. 12, Nov. 1957, p. 1020-1026.

Iron ores evaluated from standpoint of blast furnace technology demands. Present quality standards are supplemented with technological properties directly connected with the working of the furnace. 10 ref. (B general, S22; Fe, RM-n)

46-B. (German.) **Smelting Trials With Swedish Ore Pellets.** Alfred Reckmann and Walter Misch. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 21-27.

6 ref. (B16a, D1a; Fe, RM-n)

47-B.* (Russian.) **Intensification of Sintering Process by Burning Limestone on Top of Sinter Bed (for Later Use of Resulting Lime in Sinter Mix).** D. A. Kissin and A. V. Drimbo. *Stal',* v. 17, Oct. 1957, p. 868-873. (Henry

Brutcher, Altadena, Calif., Translation no. 4068.)

Chemical composition of the raw materials. Details of sintering process where limestone is burned on the surface of the burden in the sintering plant. Design of the plant. Influence of moisture, quantity of fuel, burden charge and limestone size upon the degree of limestone burning and the time of sintering. Production possibilities. (B16a; Fe, RM-n)

48-B.* Research Leading to the Design of the Guest Keen Iron and Steel Sintering Plant. Robert Parker. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1395-1405.

Principles determining design of an English plant and results of pilot plant investigation of sintering. Effect on sinter quality and output of coke size, dry mixing, wetting, pelletizing, use of deeper sintering beds, basicity, heat input at ignition, coke and moisture percentage and lime additions. (B16a; Fe)

49-B.* New Process Developed for Treating Iron Ore Concentrates. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1430-1431.

Process formed finely ground magnetite concentrate into pellets followed by drying with hot gases at 600 to 800° F., oxidizing at 1750 to 1850° F. to convert magnetic to hematite and then pellets are heat treated at about 2400° F. in rotary kiln to develop optimum pellet strength. Process evaluated on pilot-plant scale. (B16b; Fe)

50-B. Addition of Pulverized Calcitic Limestone to Magnetite Concentrates and Its Beneficial Effects on Improved Sinter Quality and Increasd Blast Furnace Production. R. K. Glass. *Blast Furnace and Steel Plant,* v. 46, Feb. 1958, p. 198-204.

(B16a, D1; AD-r)

51-B.* Fundamental Researches Into the Iron Ore Sintering Process. R. Wild. *Imperial College Chemical Engineering Society, Journal,* v. 10, 1956, p. 33-50.

Laboratory sintering technique using inert materials was developed. Study of temperature distribution and time for completion of sintering in relation to bulk density of material used, gives basis for concept of a relatively constant air requirement for sintering unit weight of mix. Use of a wide range of water and calcium carbonate in the mixes clarified relationship between fuel needed and chemical reactions involved. Over-riding influence of heat transfer in the sintering process demonstrated; air required for sintering is largely governed by relative heat capacities of solid particles and the air. Use of fuels with different reactivities and atmospheres with different oxygen contents shows that maximum efficiency is obtained when heat transfer rate and rate of fuel combustion are correctly matched. 22 ref. (B16a; Fe)

52-B.* Metallurgical Practice at the Cam and Motor. *Mining Journal,* v. 249, Nov. 22, 1957, p. 612-613.

Concentration processes; cyanide plant at mine of Southern Rhodesia's largest Au producer. Ore is refractory to cyanide treatment and requires roasting. Plant treats 800 tons of ore per day. (B14, B15; Au)

53-B. Concentration of Beach Sands From Taree, N. S. W. S. B. Hudson. *University of Melbourne—Ore Dressing Investigations,* Report no. 529, Apr. 1957, 10 p.

Electrostatic and magnetic separation applied to a gravity concentrate yielded rutile concentrates assaying 96.0% TiO and recovering 94% of the rutile in the head sample, and a zircon concentrate assaying 99.2% zircon and recovering 92% of the zircon in the head sample. (B14j, B14n; Ti, Zr)

54-B. Treatment of Copper Tailings From Lloyd Mine, Burraga, N.S.W. J. T. Woodcock. *University of Melbourne, Ore Dressing Investigations,* Report no. 530, Apr. 1957, 18 p.

After desliming, treatment of sand by percolation to extract oxide copper was satisfactory. Grinding and flotation of leach residue satisfactorily recovered the sulphide copper. Over-all recovery from classifier sand was 93% or 63% of the Cu in the original feed. (B14, Cu)

55-B. Recovery of Monazite From Weakly Magnetic Beach Sand Minerals From Swansea, N.S.W. S. B. Hudson. *University of Melbourne, Ore Dressing Investigations,* Report no. 542, Sept. 1957, 12 p.

Over 96% of the monazite in the weakly magnetic fraction derived from dry treatment of a beach sand concentrate can be recovered in concentrates assaying 92.3% monazite, by using table concentration and magnetic and electrostatic separation of the table concentrate and redressing of the tailings. (B14; Th)

56-B.* (French.) Influence of Grain Size on the Kinetics of Contraction

of Agglomerates of Ex-Carbonyl Iron During Roasting in the Alpha Phase. Georges Cizeron. *Comptes Rendus,* v. 245, Dec. 4, 1957, p. 2051-2054.

Kinetics of contraction of agglomerates of ex-carbonyl iron can be greatly modified by varying temperature during a single roasting operation. Speed of densification can be accelerated or retarded by having second part of treatment take place at higher or lower temperature than that used at beginning of roasting. This phenomenon is closely related to variation in grain size. 4 ref. (B15, 2-59; Fe)

57-B. (Swedish.) The Vanadium Works at Otanmeki. Martti Merenmies. *Teknisk Tidsskrift,* v. 87, Sept. 10, 1957, p. 723-724.

Metal content of the ore; ore preparation; extraction of vanadium pentoxide. (B14; V)

58-B. Some Experiences and Recent Developments in Sintering Australian Iron Ores. A. K. Farey. *Australasian Institute of Mining and Metallurgy, Proceedings,* no. 183, Sept. 1957, p. 107-152.

12 ref. (B16; Fe)

59-B. Lead and Zinc in California. J. Grant Goodwin. *California Journal of Mines and Geology,* v. 53, July-Oct. 1957, 58 p.

Geology, mines, smelting. 520 ref. (B general, A11a; Pb, Zn)

60-B. Dry Concentration of Iron Ore. *Engineering and Mining Journal,* v. 159, Jan. 1958, p. 88-89.

Using Quebec specular hematite crushed to 20-mesh and air classified to 200-mesh, it was found that the iron ore can be dry concentrated in high-tension separators to 65% Fe at better than 90% total Fe recovery. (B14n; B16b, Fe)

61-B. Beneficiation of Salem Iron Ores and Their Reduction With South Arcot Lignite. C. V. S. Ratnam and T. R. Balachandran. *Indian and Eastern Engineer,* v. 121, Oct. 1957, p. 233-238.

8 ref. (B13, B14, D8n; Fe)

62-B. Combustion of Carbon and Thermal Balance in Sintering. J. Michard. *Iron and Coal Trades Review,* v. 175, Dec. 27, 1957.

23 ref. (B16a, D11j; Fe)

63-B.* How Molten Aluminum Affects Plastic Refractories. H. A. McDonald, J. E. Dore and W. S. Peterson. *Journal of Metals,* v. 10, Jan. 1958, p. 35-37.

Three plastic refractory, alumina-silica compositions containing Al_2O_3, were compounded and rammed. Samples of each composition were fired to 1600, 1800 and 2000° F., and one 85% Al_2O_3 piece was fired to 2400° F. Test pieces were then exposed to 7075 Al alloy at 1400° F. for 168 hr. Resistance of a plastic refractory to attack and penetration by molten Al is a function of the uncalcined clay content of the material, and the phase changes in the clay wrought by prefiring. (B19d; Al, 14-60, RM-h)

64-B. Humphreys Spiral Concentrator. Its Place in Ore Dressing. James V. Thompson. *Mining Engineering,* v. 10, Jan. 1958, p. 84-87.

Requirements and fields of application for use of wet gravity concentrator. 9 ref. (B14g, W15p, 1-52; RM-n)

65-B. Electrostatic Separation of Minerals. M. B. Donald. *Research Applied in Industry,* v. 11, Jan. 1958, p. 19-25.

23 ref. (B14n)

66-B. Treatment of Auriferous Calcine From Cassilis, Victoria. J. T. Woodcock. *University of Melbourne, Ore-Dressing Investigations,* Report no. 531, May 1957, 16 p.

(B14h; Au)

67-B. (Russian.) Magnetic Roasting of Low-Grade Hematite Ore in Layers. V. I. Karmazin. *Metallurg,* Dec. 1957, p. 5-8.

Process of enriching ores at Krivoirog basin which consist of 60% hematite and 40% quartz. Method produces concentrates with no less than 65% iron and no more than 5-8% silica. (B15; Fe)

68-B. Iron-ore Nodulizing in a Rotary Kiln. M. Gerard. *Iron and Coal Trades Review,* v. 176, Jan. 17, 1958, p. 147-159.

An alternate process of iron-ore sintering by nodulizing ores, rolling them around the inside of a revolving vessel. Chemical and physical changes taking place inside nodulizing kiln. (B16c, 1-52; Fe)

69-B.* How Theory Can Help Make More Sinter. E. W. Voice and R. Wild. *Journal of Metals,* v. 10, Feb. 1958, p. 105-110.

Investigation by British Iron and Steel Research Assoc. concludes that while the fuel requirements are related to the heat requirements of the process, the air requirements are much more dependent on the heat

capacity of the sinter mix than on the oxygen requirement of the fuel. A series of fronts travel down the bed during sintering; water evaporation, calcination, heat transfer and combustion. The efficiency of the process depends on these fronts traveling down the bed correctly phased with respect to each other. 6 ref.
(B16, A11e)

70-B.* Updraft Pelletizing of Specular-Hematite Concentrates. Donald C. Violetta. *Journal of Metals,* v. 10, Feb. 1958, p. 118-121.

Updraft method rather than the conventional downdraft method provides several distinct advantages; there is no apparent limit of the maximum bed depth. Individual balling capacities are a fractional part of the traveling grate capacity, hence a specific balling device can form specific sizes of pellets, with particular quantities of fuel, and this charge can be placed in a specific location in the pellet bed. All operations of firing, such as drying, preheating, ignition, combustion, recuperation and cooling within the bed are conducted simultaneously.
(B16b; Fe)

71-B. Downdraft Taconite Pellet Hardening. Alan English and M. F. Morgan. *Journal of Metals,* v. 10, Feb. 1958, p. 122-124.

Raw materials used in both the experimental and the commercial plants were similar and consisted of magnetic taconite concentrates, anthracite fines, bentonite and fuel oil. The main principle of pelletizing with the downdraft continuous-grate furnace, which embodies some of the features of a sintering machine, is the recovery and use of most of the sensible heat for drying and burning the product.
(B16b, 1-52; Fe)

72-B. Pelletizing in Shaft Furnaces. F. D. DeVaney. *Journal of Metals,* v. 10, Feb. 1958, p. 125-128.

Furnace at Erie Mining Co. consists of a rectangular shaft 6 ft. wide, 14 ft. long and approximately 45 ft. high. The shaft is full at all times with pellets and an amount is drawn off from the bottom at the same rate the green balls are fed into the top, so as to keep the feed line uniform. The amount of pellets in the furnace is about 180 long tons, and these move continuously down the shaft at a rate of ½ to 1 in. per min., depending on the feed rate. (B16b, 1-52)

73-B. Lurgi Pelletizing Process: A Combined Updraft-Downdraft Technique. Kurt J. E. Meyer and Hans Rausch. *Journal of Metals,* v. 10, Feb. 1958, p. 129-133.

Special features of the Lurgi pelletizing process are that addition of binders is not necessary and gas or oil is used exclusively as fuel not incorporated in the pellets. The latter permits greater control of temperature and oxidizing conditions on sintering machine. Magnetite, hematite, limonite, or mixtures of these may be pelletized by this process.
(B15b, 1-52)

74-B. Economics of Uranium Ore Processing. A. H. Ross and Ralph Toerper. *Mines Magazine,* v. 48, Jan. 1958, p. 43-44.

(B14, 17-53; U)

75-B. Laboratory Concentration of Chromite Ores, Red Mountain District, Kenai Peninsula, Alaska. R. R. Wells, F. T. Sterling, E. G. Erspamer and W. A. Stickney. *U. S. Bureau of Mines, Report of Investigations 5377,* Apr. 1957, 22 p.

(B14; Cr)

76-B. Concentration of Beryl Ore From Torington, N. S. W. *University of Melbourne, Ore-Dressing Investigations,* Report no. 532, May 1957, 4 p.

(B14; Be)

77-B. Table Concentration of Cobalt-Manganese Oxide Ore From Near Queenstown, Victoria. *University of Melbourne, Ore-Dressing Investigations,* Report no. 532, May 1957, 4 p.

(B14; Co, Mn)

78-B. (Hungarian.) **Comparative Examination of Salt Separation Methods in Alumina Plants.** Mihaly Mariassy. *Kohaszati Lapok,* v. 12, Mar. 1957, p. 126-129.

6 ref. (B-general, C23; Al, RM-n)

79-B. (Hungarian.) **Concentration of Manganese Carbonate Ores.** Lajos Burnoczky. *Kohaszati Lapok,* v. 12, June 1957, p. 240-246.

Concentration by washing, roasting and magnetic separation. Concentrate containing carbonate may be utilized for cast iron.
(B14j, B13d, B15; Mn)

80-B.* (German.) **Study of Wear of Blast Furnace Brickwork by Radioactive Isotopes.** Joachim Holzhey. *Neue Hütte,* v. 2, Nov. 1957, p. 665-670.

Furnace construction; arrangement of ray sources; adsorption by

brick work and steel plates; measurement; test data; radiation effect on the furnace; treatment of the radioactive pig iron. 4 ref.
(B19d, 1-59, W17g)

81-B. Stockholm Mineral Dressing Congress. *Mine and Quarry Engineering,* v. 24, Feb. 1958, p. 61-69.

Mineral dressing processes; classification, gravity separation, magnetic concentration, roasting and sintering. (B14)

82-B.* Major Welding Manufacturer Recovers Rutile in Florida. *Engineering and Mining Journal,* v. 158, Dec. 1957, p. 98-99.

Design, operation of floating dredge and concentrating plant which up-grades feed containing only 2% heavy minerals to a concentrate containing 64%, including rutile, ilmenite and zircon. (B14; Ti)

83-B.* E&MJ's Flowsheet Design Book. *Engineering and Mining Journal,* v. 158, Dec. 1957, p. 145-160.

Flowsheets covering Cu flotation, Au roasting, flotation and cyanidation, Au amalgamation and cyanidation, magnetic separation and pelletizing of magnetic taconite, emulsion flotation of Mn, molybdenite recovery, Ge precipitation, Zn fuming, and combined leach-float for potash. (B14, B15, B16; Cu, Au, Ge, Fe, Mn, Mo, Zn)

84-B. Upgrading Iron Ore by Fluidized Magnetic Conversion. Robert J. Priestly. *Blast Furnace and Steel Plant,* v. 46, Mar. 1958, p. 303-306.

(B15q; Fe)

85-B.* New Process Reduces Iron Ores With Carbon Monoxide. P. M. Unterweiser. *Iron Age,* v. 181, Jan. 30, 1958, p. 93-95.

The Stelling process, a Swedish development, utilizes carbon monoxide at atmospheric pressures, temperatures of about 1100° F. and a fluidized ore bed for the reduction of iron ore. The product formed is iron carbide. Process has been checked on pilot plant scale.
(B15q; Fe)

86-B. (French.) Differential Flotation of Lead-Zinc Ores. A Suggested Classification of Ores and Flotation Techniques. M. Rey. *Revue de l'Industrie Minerale,* v. 40, Jan. 1958, p. 65-74.

10 ref. (B14h; Pb, Zn)

87-B. (Portugese.) Developments in the Sintering of Lead and Zinc Ores in Dwight-Lloyd Furnaces. Tharcisio D. de Souza Santos. *ABM, Boletim da Associacao Brasileira de Metais,* v. 13, Oct. 1957, p. 349-363.

14 ref. (B16a, W15a; Pb, Zn)

88-B.* (Slovenian.) Chemistry of Roasting Arsenic and Antimony Trisulphides and Cobalt and Nickel Sulphides, as Well as Their Binary Mixtures. Krsto Cazafura. *Rudarsko-Metalurski Zbornik,* no. 4, 1957, p. 345-359.

Thermal and chemical analysis data explain the products obtained by roasting the sulphides at characteristic temperatures. The oxidation process may be divided into two phases—reactions which occur between sulphide and oxygen, and reactions between the products of the first phase and the unchanged sulphide on contact surfaces. Purpose of the tests is the production of Ni and Co from their sulphide concentrates which contain arsenic and antimony sulphides. 18 ref.
(B15, P12; Ni, Co)

89-B. Minerals Beneficiation in 1957. *Mining Engineering,* v. 10, no. 2, Feb. 1958, p. 244-252.

(B12, B13, B14)

90-B. (German.) Limits and Possibilities of Modern Preparation Techniques. Helmut Kirchberg. *Neue Hütte,* v. 3, Jan. 1958, p. 1-9.

Magnetic separation and flotation of low-grade siliceous ores; progress in concentration by flotation.
(B14)

91-B. Behaviour of Xanthates in Flotation. C. H. G. Bushell. *Canadian Mining and Metallurgical Bulletin,* v. 51, Mar. 1958, p. 137-149.

10 ref. (B14h)

92-B. Production of Finest Ore Agglomerates and Their Behavior in the Blast Furnace. Ludwig von Bogdandy and Rudolf Schmolke. *Stahl und Eisen,* v. 77, May 30, 1957, p. 685-692. (Iron and Steel Institute, Translation no. 648.)

Previously abstracted from original. See item 66-B, 1957.
(B16, D1; Fe)

93-B. Sinter Cooling: An Essential Element of Modern Plant. Gunter Brandes and Helmut Wendelborn. *Stahl und Eisen,* v. 77, May 30, 1957, p. 693-700. (Iron and Steel Institute, Translation no. 649.)

Previously abstracted from original. See item 67-B, 1957.
(B16a, 1-2; Fe)

94-B.* (German.) Methods of Titanium Ore Dressing. Willy K. Finn. *Zeitschrift für Erzbergbau und Met-*

allhüttenwesen, v. 10, Oct. 1957, p. 471-479.

Survey of Ti ore occurrences, various ore dressing methods such as flotation, gravity separation, electrostatic and magnetic separations, and their applicability for secondary occurrences for titaniferous magnetites and for ilmenite-hematite ores. 3 ref. (B14, A11a; Ti, RM-n)

95-B.* (German.) **Influence of Surface Roughness, Grain Form and Grain Size of Ores Upon the Losses of Burden Material During Flotations.** Gerhard Gerth. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 493-499.

The surface roughness for various ores was determined and the losses of burden materials through adhesion to the ore particles investigated. Losses are high for flat grain, lower for skin-type grains. Surface roughness up to 8μ. resulted in burden material losses of 2.3 g. per ton; from 8 to 10μ. approximately 2.9 g. per ton; at roughness greater than 10μ. approximately 4 g. per ton. Forster surface roughness tester described. 3 ref. (B14h, S15, RM-n)

96-B. Flotation: The Art of Utilizing Modifying Agents. Samuel P. Moyer. *Mining Magazine,* v. 98, Jan. 1958, p. 9-16.

Review of tools available to mineral-dressing engineer. (B14h)

97-B. Mineral Dressing Processes in Review. Pt. 2. E. J. Pryor. *Mining Magazine,* v. 98, Jan. 1958, p. 22-27.

(B14h, C19; 14-59)

98-B. Pb-Zn-Cu: How Flotation's Most Difficult Separation Is Being Done. Frank W. McQuiston. *Mining World,* v. 20, Feb. 1958, p. 49-52. (B14h; Cu, Pb, Zn)

99-B. Holly Minerals' New Three-Step Process for Impure Mercury Ores. Ernest Oberbillig, James Fyfe, William Aitkenhead and John Jaekel. *Mining World,* v. 20, Feb. 1958, p. 53-56.

New method for treating "impure" Hg ores consisting of crushing, grinding and flotation concentration; leaching concentrates with sodium sulphide; electrolytic precipitation of Hg from the alkaline sulphide solution. 6 ref. (B13, B14h, C19n, C23p; Hg)

100-B.* (French.) **Use of the S. K. Porosimeter for Measuring the Porosity of Refractories.** J. Baron. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 161, Mar. 1957, 7 p.

Principles of use, some results obtained with iron ore sinters and various refractory materials, with total porosity broken down into closed porosity, microporosity, average porosity, and macroporosity. Results compared with those obtained by conventional methods. 12 ref. (B19d)

101-B. (Russian.) **Nodulizing Finely Pulverized Iron Ores.** G. B. Gubin. *Metallurg,* Feb. 1958, p. 3-4.

(B16c; Fe)

102-B. Use of Castable Ceramics for High Temperature Fixtures. Herbert Schwartz. *Industrial Heating,* v. 25, Feb. 1958, p. 362-370.

(B19)

103-B. Intergranular Comminution by Heating. J. H. Brown, A. M. Gaudin and C. M. Loeb, Jr. *Mining Engineering,* v. 10, Apr. 1958, p. 490-496.

Tests on granite, syenite, taconite and marble. 13 ref. (B13; Fe, RM-n)

104-B. (Russian.) **Mechanism of Pellet Strengthening on Burning.** A. N. Pokhvisnev and B. A. Savel'ev. *Stal',* Feb. 1958, p. 104-109.

Burning of pellets of magnetite concentrates in atmosphere of increased oxygen content results in complete oxidation at top rate of magnetite grains and their conversion into hematite grains. Pellets should be kept at maximum temperature for completion of recrystallization of hematite grains. (B16a; Fe)

105-B. (Russian.) **Testing of Unburnt Magnesite-Chromite Bricks for Open-hearth Roofs.** B. P. Okhrimovich, A. E. Pribytkov, A. I. Uzberg and P. A. Rumm. *Stal',* Feb. 1958, p. 126-130.

Intensity of wear of unburnt magnesite-chromite bricks is only slightly higher than that of burnt bricks, while the cost is only half as great and the process of production of unburnt bricks is considerably simpler. (B19d, D2; RM-h38)

106-B. (Russian.) **Decarburization of Solid Ferrochrome Under Vacuum.** I. D. Kirichenko. *Stal',* Feb. 1958, p. 131-137.

Decarbonization under vacuum by means of iron ore or by previously oxidized ferrochrome makes possible the production of an inexpensive low-silicon and carbonless ferrochrome containing 0.01-0.3% carbon. (B-general, 1-73; Cr, AD-n31)

107-B. Effect of Roasting on Recovery of Uranium and Vanadium

From Carnotite Ores by Carbonate Leaching. J. Halpern, F. A. Forward and A. H. Ross. *AIME Transactions,* v. 212, Feb. 1958, p. 65-70.

Effect of roasting carnotite ores in the presence of various reagents on subsequent recoveries of U and V by carbonate leaching. An attempt to account for the results in terms of the chemical reactions that occur during the roast treatment. 8 ref. (B15, C19n; U, V)

108-B. Sinter Roasting of Lead-Rich Galena Concentrates at the Electrothermic Lead Plant of the Ronnskar Works, Sweden. S. J. Wallden, N. B. Lindvall and K. G. Gorling. *AIME Transactions,* v. 212, Apr. 1958, p. 146-153.

New method and plant for pelletizing and sintering lead concentrates with 70-80% Pb contents. 7 ref. (B16, B15, Pb)

109-B.* Production of Self-Fluxing Sinter. J. S. McMahan. *Blast Furnace and Steel Plant,* v. 46, Apr. 1958, p. 373-376.

Adding 18% dolomite fines to the sinter mixture increased blast furnace production rate about 8½% and lowered coke rate about 6½%. Sinter plant production rates higher when making dolomitic sinter. Dolomitic sinter more pliable and softer than regular sinter.
(B16a, D1; Fe, RM-n)

110-B. Appleby-Frodingham Sinter Plants. B. L. Robertson and R. H. Siddons. *Iron and Coal Trades Review,* v. 176, Mar. 28, 1958, p. 739-750.

Some important factors governing sinter plant performance. Fan operation and circulating load, for example, have been isolated and examined and a method of plant rating worked out. 5 ref.
(B16, W13e, D1a; Fe, RM-n)

111-B. Electric Furnace Refractories. E. C. Wright. *Metal Progress,* v. 73, May 1958, p. 87-88.

Refractory slurries are poured into forms around electrode parts; self-curing mixes are made with additions of silicon metal powder and sodium silicate whose reaction generates enough heat to set and dry the rammed refractory.
(B19, D5; RM-h)

112-B. Beneficiation of Uranium Ores by Flotation. John A. Jaekel. *Washington State Institute of Technology,* Technical Report 4, 1958, 8 p.

(B14h; U)

113-B. Importance of Stainless Scrap Segregation. T. J. Wayne. *Waste Trade Journal,* v. 104, Mar. 1958, p. 38-39.

(B23; SS)

114-B. Intensification of the Sintering Process by Burning Limestone on Top of Sinter Bed. Later Use of Resulting Lime in Sinter Mix. D. A. Kissin and A. V. Drimbo. *Stal',* v. 17, no. 10, 1957, p. 868-873. (Henry Brutcher, Altadena, Calif., Translation no. 4068.)

Previously abstracted from original. See item 47-B, 1958.
(B16a; Fe, RM-n)

115-B. Increased Sintering Rates Obtained by Modifying the Mixing Technique. A. E. Lebedev. *Metallurg,* v. 2, no. 5, 1957, p. 8. (Henry Brutcher, Altadena, Calif., Translation no. 4083.)

Previously abstracted from original. See item 92-B, 1957.
(B16a; Fe, RM-n)

116-B. Experiments on the Pressing of Refractories at High Temperatures. V. Ya. Riskin and V. V. Goncharov. *Ogeneupory,* v. 22, no. 4, 1957, p. 186-188. (Henry Brutcher, Altadena, Calif., Translation no. 4098.)

(B19)

117-B. (French.) Thermodynamic Study of the Action of the Reagents in the Flotation of Ores. Luigi Dobrescu. *Revue de Métallurgie (Bucarest),* v. 2, 1957, p. 129-144.

A theoretical discussion of such surface phenomena as the interaction of the flotation reagents with the ore surfaces, the wetting of the ores and the adhesion of ore particles to the air bubbles in the sludge that chiefly determine the process of flotation. 11 ref.
(B14h, P12, RM-n)

118-B. (German.) Production of Aluminum From Nepheline. N. Polutoff. *Aluminium,* v. 34, Apr. 1958, p. 192-193.

Volkhov Aluminium Works process of extracting alumina from nepheline concentrate (30% Al) involves comminuting with limestone and a series of wet grinding, filtering, carbonizing, washing and calcining. (B14; Al)

119-B. New Process for Heat Treating Iron Ore Concentrates. *Canadian Mining Journal,* v. 78, Nov. 1957, p. 98-99.

(B16b; Fe)

120-B. International Mineral Dressing Congress, Stockholm, Sweden, 1957. *Canadian Mining Journal,* v. 78, Nov. 1957, p. 100-105.

(B13, B14, B15, B16)

121-B. Tougher Taconite Pellets for Blast Furnaces. *Chemical Processing,* v. 20, Dec. 1957, p. 104-106.

Lower fuel and maintenance costs plus virtual elimination of pellet breakage are advantages cited in new process. (B16b; Fe)

122-B. Some Improvements in Sinter Plant Ignition. W. C. E. Bell. *Iron and Coal Trades Review,* v. 175, Nov. 8, 1957, p. 1093-1096.

Adoption of an ignition hood for coke oven gas firing and improvement in sinter quality which resulted. (B16a, 1-52; Fe)

123-B.* (German.) Effect of Small Amounts of Alloying Components Forming Solid Solutions on Sinter Behavior. F. Thümmler. *Planseeberichte für Pulvermetallurgie,* v. 6, Apr. 1958, p. 2-16.

Effect on sinter behavior of small amounts of Fe, Co, Cu and Ag, which form solid solutions. Sintering is hindered if the solid solution crystals are formed before sintering while it is aided if they are formed during sintering. Relations with the difference in atomic radii between the added and the base metals and improvement of mechanical properties. 22 ref. (B16, 2-60)

124-B. (Russian.) Improvement of Lead Concentrates by Pyrometallurgical Treatment. S. Mantya, J. Buzinku and N. Petrescu. *Revue de Metallurgie (Bucarest),* v. 2, 1957, p. 107-110.

(B15; Pb)

125-B. How Empresa Minera de Catavi Concentrates Tin Ores. Oscar Davila-Michel. *Engineering and Mining Journal,* v. 158, Nov. 1957, p. 100-106, 108.

(B14; Sn)

126-B. Recovery of High-Grade Iron Ore at Copper Cliff, Ont. Paul Queneau, E. H. Bracken and D. Kelly. *Foundry Trade Journal,* v. 104, May 15, 1958, p. 579-580.

(B14, B15, B16f; Fe)

127-B. The Urgency of Mineral Beneficiation and Extractive Metallurgical Techniques in India. *Indian Minerals,* v. 11, Apr-June 1957, p. 115-122.

(B14, C19)

128-B.* Liquefied Petroleum Gases for Controlled Atmosphere Production. L. G. W. Palethorpe. *Metallurgia,* v. 57, May 1958, p. 219-223.

Liquefied petroleum gases in the production of controlled atmospheres for heat treatment furnaces, and for such operations as clean hardening, carburizing, carbo-nitriding and bright annealing. (B25, J2k)

129-B.* Agglomeration Leaching of Uranium Ores. James W. Crosby. *Washington State Institute of Technology, Bulletin 241,* 1958, 30 p.

Ore is crushed to about 10-mesh, agglomerated with 100 g. per liter sulphuric acid, and leached in tanks by percolation. Initial acid strengths are controlled to furnish a terminal pH in the correct range for ion exchange extraction of the uranium. Effluent solutions are clear and require no additional filtration or settling. Recoveries in excess of 80% on ores which assay only 0.07% U_3O_8, or 90% with 0.13% U_3O_8 or better. 4 ref. (B14, C19n; U)

130-B. Smelting Trials With Swedish Ore Pellets. Alfred Reckmann and Walter Misch. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 21-27. (Iron and Steel Institute Translation no. 865.)

Previously abstracted from original. See item 46-B, 1958.
(B16a, D1a; Fe, RM-n)

131-B.* (Portuguese.) Sintering Operations at the Plant of Queiroz Junior S/A. J. J. Carneiro de Mendonca. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 31-40.

Continuous, rotary table equipment for sintering itabirite ore. Hourly production is about 8 tons per hr. Operational details, costs, product analysis. (B16, 1-52; Fe)

132-B. (Portuguese.) Sinter Production Capacity in Installations Equipped With Intermittent Furnaces. Tharcisio D. deSouza Santos. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 41-52.

6 ref. (B16, 1-52)

133-B. (Russian.) Pelletizing Iron Ore Concentrates and Iron Ore Fines. F. M. Bazanov, F. F. Kolesanov, I. L. Malkin and S. I. Sharov. *Stal',* v. 18, Apr. 1958, p. 289-294.

Advantages of agglomerating iron ore concentrates and fines by method of pelletizing and burning of pellets on grates of sintering machine as compared to sintering. (B16b; Fe, RM-n)

134-B. (Russian.) **Stability of Highly Magnetic Iron Oxides in Roasted Ores.** P. A. Tatsienko. *Stal'*, v. 18, Apr. 1958, p. 295-297.

Investigation to determine types of ore to be used for reducing-oxidizing or reducing-calcination. 9 ref. (B15; Fe, RM-n)

135-B. (Spanish.) **Development of a Concentration Cycle for Gold Ore From the Moradito Mine in Culampaja.** Angel J. Martellota. *Facultad de Ciencias Quimicas, Universidad Nacional de la Plata, Revista,* v. 29, 1955-56, p. 71-77.

(B14; Au)

136-B. (Spanish.) **Contribution to the Study of Concentration of a Scheelite Ore.** Moisés R. Naon. *Facultad de Ciencias Quimicas, Universidad Nacional de la Plata, Revista,* v. 29, 1955-56, p. 95-100.

(B14; W)

137-B. Ore Dressing Investigations. Gravity Concentration and Magnetic Separation of Ilmenite Beach Sands From Capel, W. A. E. Tasker. *University of Melbourne, Commonwealth Scientific and Industrial Research Organization* no. 697, Sept. 16, 1957, 3 p.

(B14g, B14j; Ti)

138-B. Properties of Refractories. *Industrial Heating,* v. 25, May 1958, p. 1016, 1018, 1020, 1022.

Abstracts of papers presented at the annual meeting of the American Ceramic Society, Dallas, Tex.
(B19; RM-h)

139-B. High-Alumina Refractories. D. S. Rutman, L. V. Vinogradova, K. A. Krasotin and D. E. Min'Kov. *Iron and Steel,* v. 31, May 1958, p. 184-185. (From *Ogneupory,* v. 12, 1957, p. 546-549.)

5 ref. (B19, D9p, W18n; RM-h40)

140-B.* Oxygen and the Steel Plant: Maintenance Experience With O_2 Plants at Sparrows Point. A. Stutzer. *Iron and Steel Engineer,* v. 35, May 1958, p. 84-86.

Six oxygen units of 7000 cu. ft. per hr. are serviced with an approximate downtime of 3% of possible total operating time. This seemingly high percentage permits maintenance of a continuous flow of nitrogen from oxygen units for prepared atmosphere consumed by box annealing furnaces. (B25, J2k; O)

141-B. New Developments in Gold Reduction. *Mining Journal,* v. 250, Apr. 18, 1958, p. 440-441.

(B13, B14; Au)

142-B. Greenland Lead-Zinc Mine Beats Elements With Underground Mill. Bertil Astlind and P. H. Fahlstrom. *Mining World,* v. 19, Nov. 1957, p. 46-50.

(B14h; Pb, Zn)

143-B. New Pellet Hardening Method Uses Grate and Kiln Firing. W. F. Stowasser. *Mining World,* v. 19, Nov. 1957, p. 59-60.

New process for pelletizing and heat treating magnetite concentrates to form hard, durable pellets for blast furnaces. (B16b; Fe)

144-B. Three Ways to Handle Scrap. *Steel,* v. 142, June 9, 1958, p. 96, 99.

(B23; ST)

145-B. Iron Ore Preparation in the USSR. I. P. Bardine. *Iron and Coal Trades Review,* v. 176, May 16, 1958, p. 1153-1154.

(B16, Fe)

146-B. Hydrometallurgical Separations. Merrill F. McCarty and Eugene E. Woodward. *Mines Magazine,* v. 48, Mar. 1958, p. 25-27.

In uranium recovery.
(B14; U, RM-n)

147-B. Titania Concentrate From Ilmenite and Its Chlorination Properties. Seppo Wilska. *Suomen Kemistilehti,* v. 31, no. 2, 1958, p. 156-160.

(B14; Ti)

148-B.* (Italian.) **Refractoriness Tests on a Part of the System CaO-MgO-SiO_2-Al_2O_3.** R. Zoja. *Metallurgia Italiana,* v. 50, Mar. 1958, p. 85-90.

Spherical test pieces composed of two half-spheres 20 mm. in diameter, fitted together, were placed in tapered cavities in preheated disk of refractory material. Disks were held at desired temperature (varying between 1350 and 1550° C. for different runs) for 20 min., and agglomeration, softening and melting of specimens was observed. Systems tested were those having 5% and 10% Al_2O_3, 10% to 50% SiO, 25% to 80% MgO and 5% to 35% CaO. (B19d)

149-B.* (Italian.) **Possibilities of X-Ray Diffraction Analysis of Refractories.** E. Moltoni and G. Giuseppetti. *Metallurgia Italiana,* v. 50, Mar. 1958, p. 91-100.

Advantages of X-ray diffraction study of silica, alumina-silica, dolomite, magnesite and special refractories for determination of crystal size, structure, composition, texture, impurities and speed of conversion. Tabulation of powder spectra of 54

crystalline compounds having refractory interest. 47 ref. (B19d)

150-B.* (Italian.) **Investigation of the Resistance of an Alumina-Silica Refractory to Sudden Cooling Tests.** L. Massimilla and S. Bracale. *Metallurgia Italiana,* v. 50, Mar. 1958, p. 101-105.

Both theory of maximum stress and Weibull statistical theory are shown to provide reliable data on resistance of panels of refractory brick to thermal cycles when mathematical results are compared with those obtained by actual testing. In case studied, material resisted fracture when subjected to sudden temperature drops from 600 to 20° C. Drops from higher temperatures caused fracture even though cooling was gradual. 6 ref. (B19d)

151-B. High-Temperature Strength of Basic Refractories. E. I. Greaves and J. MacKenzie. *British Ceramic Society, Transactions,* v. 57, Apr. 1958, p. 187-198.

A good correlation exists between high-temperature strength, creep characteristics and service performance of openhearth furnace roofs. (B19d, D2; RM-h)

152-B. The Spalling of Silica Bricks. J. Hargreaves. *British Ceramic Society, Transactions,* v. 57, May 1958, p. 242-257.

(B19; RM-h)

153-B. Influence of Porosity on Silica-Roof Performance. H. R. Lahr and C. W. Hardy. *British Ceramic Society, Transactions,* v. 57, May 1958, p. 271-284.

Porosities in the range of 15 to 30% have a significant but small influence on openhearth roof performances, the lower porosity bricks being superior. (B19d, D2; RM-h)

154-B. Mining in Finland. Pt. 4. Mining, Milling, Smelting Outokumpu Copper Ore. C. Mamen. *Canadian Mining Journal,* v. 79, May 1958, p. 73-81.

(B-general, C-general; Cu)

155-B. How Bacteria Leaches Low-Grade Ores. *Engineering and Mining Journal,* v. 159, June 1958, p. 89-91.

Several strains of bacteria are able to live and multiply in relatively high concentrations of dissolved Cu, and can be used to leach and recover Cu, Mo and Zn from their sulphide and mixed oxide-sulphide ores. (B14, Cu, Mo, Zn)

156-B.* **Fine Grinding at Supercritical Speed.** R. T. Hukki. *Mining Engineering,* v. 10, *AIME Transactions,* v. 211, May 1958, p. 581-591.

Relationship between mill grinding capacity and specific gravity of grinding media, shape of media, mill speed, surface of mill lining, energy used in grinding at subcritical and supercritical speeds. 19 ref. (B13c)

157-B. Grinding Ball Size Selection. Fred C. Bond. *Mining Engineering,* v. 10, *AIME Transactions,* v. 211, May 1958, p. 592-595.

Empirical and theoretical equations for calculating proper sizes of ball and rods to be added to tumbling grinding mills. Table of ball and rod weights, volume and surface area. Proper ball and rod size distribution for starting mill. (B13c, 1-52)

158-B. The Relative Resistances to Basic Slags of Magnesite and Dolomite. W. F. Ford and J. White, *Refractories Journal,* no. 4, Apr. 1958, p. 171-174.

(B19, D-general; RM-h, RM-q)

159-B. Studies on the Flotation of Pyrites. Effect of Roasting. Hiromu Fushimi. *Waseda University, School of Science and Engineering,* Memoirs, no. 21, 1957, p. 91-100.

(B14h, B15; Fe)

160-B.* (Czech.) **Improvement in the Production of Vanadium From Slags.** Drahomir Trojka and Karel Palka. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 371-384.

Common properties of vanadium and methods of preparation. Effect of different conditions on V yield in the oxidizing roasting of V slags. Maximum fineness of roasting charge, rapid cooling from roasting temperature of 820° C. and presence of sodium chloride at rate of 8% elevate the yield of V. 7 ref. (B15n, A11d; V, RM-q)

161-B.* (German.) **Comparative Flotation Experiments With Amines and Xanthates Using Sulphide Ores.** Urmas Runolinna. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, May 1958, p. 199-209.

Use of amines as flotation reagents; chemical properties of amines; comparative experiments with amines and xanthates on four various Finnish ores. Influence of liquid preparation, temperature, fineness of grinding, regulators, auxiliary collectors and spumers. 24 ref. (B14h)

162-B. Treatment Tests on an Oxidized Copper-Cobalt-Gold Ore From Carlow Castle, Roebourne, Western Australia. *Australia Scientific and Industrial Research Organization, Ore Dressing Investigations,* Report no. 681, Mar. 18, 1958, 20 p.
(B11, Cu, Co, Au, RM-n)

163-B. New Process for Heat Treating Iron Ore Concentrates. *Canadian Mining Journal,* v. 78, Nov. 1957, p. 98-99.
(B16b; Fe)

164-B. International Mineral Dressing Congress, Stockholm, Sweden. *Canadian Mining Journal,* v. 78, Nov. 1957, p. 100-105.
(B13, B14, B15, B16)

165-B. Tougher Taconite Pellets for Blast Furnaces. *Chemical Processing,* v. 20, Dec. 1957, p. 104-106.

Lower fuel and maintenance costs plus virtual elimination of pellet breakage are advantages cited in new process. (B16b, Fe)

166-B. Use of Fractional Factorial Designs in Sintering Experiments. C. J. Davis and J. D. Hromi. *Engineering Sciences, Technical Paper,* v. 4, no. 61, 1957, 12 p.

Tests point up increased production rates and decreased coke rate realized through use of high percent sinter in blast furnace burden. 8 ref. (B16, D1a, 1-54; Fe)

167-B. Current Electric Furnace Refractories Practice. A. H. Thomson and L. A. Stoyell. *Industrial Heating,* v. 25, June 1958, p. 1215-1216, 1218, 1220.

Canadian basic refractory practice in electric furnaces and self-baking refractory mix. (To be continued). (B19, W17j; RM-h)

168-B. Some Improvements in Sinter Plant Ignition. W. C. E. Bell. *Iron and Coal Trades Review,* v. 175, Nov. 8, 1957, p. 1093-1096.

Adoption of an ignition hood for coke oven gas firing and improvement in sinter quality which resulted. (B16a, 1-52; Fe)

169-B.* Production of Sinter by the Intermittent Process. Paul Thomas. *Iron and Coal Trades Review,* v. 176, Mar. 14, 1958, p. 615-618.

GHH pan sintering process in which pans of sinter are treated individually, instead of passing continuously around an endless belt mechanism. Advantage is greater flexibility. (B16a)

170-B. Cyclone Classification at Chuquicamata. D. S. Sanders. *Mining Congress Journal,* v. 44, Mar. 1958, p. 55-58, 72.

Using cyclones in place of spiral classifiers. (B13; Cu)

171-B. (Book.) **Low Grade Ores. A Survey of American Research Methods.** Jan. 1958. 158 p. Organization for European Economic Co-Operation, 1346 Connecticut Ave. N.W., Washington 6, D. C. $3.

Report by members of European productivity agency on a survey made of research facilities, current research, processes presently used for underdevelopment, ore dressing, beneficiation and concentration for metals including Fe, Ni, Co, Cr, Mo, Ta, Cb, V, Ti, W, Cu, Zn, Cd, Pb, Sn, Al, Mg, Au, Ag, Ge, Li, Zr, Se and Mg. 118 ref. (B14)

172-B. Ore Dressing Developments in Australia. Pt. 2. Filtration and Thickening; Gold Ore Treatment; Coal Preparation; Treatment of a Wolfram-Cassiterite Product; Beach Sands; Uranium; Research. H. H. Dunkin. *Chemical Engineering and Mining Review,* v. 50, Apr. 15, 1958, p. 40-49.

32 ref. (B13, B14)

173-B. Mineral Dressing. Norman Weiss. *Mining Congress Journal,* v. 44, Feb. 1958, p. 70-74.

Physical processes are being replaced with wet and dry processes involving chemical-physical change. Review of papers at International Mineral Dressing Congress in 1957, Stockholm, Sweden.
(B13, B14, B16; Fe, U)

174-B. Hydrometallurgical Processes at High Pressures. F. A. Forward and J. Halpern. *Journal of Applied Chemistry of the USSR,* v. 30, (1957), p. 1-20. (Translation by Consultants Bureau, Inc.)

103 ref. (B14, 3-74)

175-B. Problems in Sinter Production. L. I. Kharash. *Stal',* v. 17, no. 2, 1957, p. 106-114. (Iron and Steel Institute Translation no. 761.)

Previously abstracted from original. See item 129-B, 1957. (B16a; Fe)

176-B.* (Japanese.) A Method of Testing the Endurability of Refractory Brick. Shoji Tomita. *Japan Foundrymen's Society,* v. 30, May 1958, p. 418-426.

Endurance of cupola brick is closely related to its resistance to slag erosion; spalling resistance has a considerable effect on its en-

durance; endurance of the brick is highly dependent upon the heating temperature in the cupola; Agalmatolite brick, under the proper conditions, has highest endurance as cupola brick. (B19d, W18d)

177-B. (English.) **New Aluminum-Bearing Minerals in Bauxites.** S. I. Beneslavsky. *Academy of Sciences of the USSR, Proceedings,* v. 113, 1957, p. 367-369.

Aluminum is found in the composition of some minerals of iron oxide and hydroxide, which are the chief components of the nonsoluble residues of bauxite. (B-general; Al)

178-B* (German.) **Contribution to the Study of Flotation Kinetics.** I. Huber Panu. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 112-120.

New flotation kinetics formulas express the variation of the extraction of the useful substance and of the flotation velocity as a function of time, the formulas taking into account the actual conditions under which the flotation is effected. 3 ref. (B14h)

179-B.* (German.) **Chemical Reactions of Sulphur in Coal During the Coking Process. An Investigation With the Help of Radioactive Isotope S^{35}.** Hanns Jurgen Reintjes. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 283-291.

S^{35} added to coal in the form of calcium sulphate and pyrite, and the distribution of sulphur in coal among the degassing products was studied. Reactions of pyrites and sulphates were measured directly while the organic sulphur was determined through different calculations. Tables show sulphur distribution activity measurements and their evaluation. Testing apparatus. (B17g, 1-59; *S*)

180-B. (German.) **Application of Radioactive Isotopes in the Examination of the Flotation Process.** I. N. Plakssin. *Freiberger Forschungshefte,* no. A59, Dec. 1957, p. 5-44.

Radiometric and microradiographic methods. 24 ref. (B14h, 1-59)

181-B. (German.) **Theoretical Tests of the Flotation Process.** O. S. Bogdanow. *Freiberger Forschungshefte,* no. A59, Dec. 1957, p. 45-74.

(B14h)

182-B.* (German.) **Concentration of Zinc Ore in the Freiberg Area.** Johannes Lohn. *Neue Hütte,* v. 3, Apr. 1958, p. 203-213.

Tests were carried out to determine the possibilities of separating Cu_2FeSNS_4 from accompanying ores, in particular lead and zinc concentrates. Only the selective flotation method proved satisfactory. Through bubble adherence tests the flotation properties were determined. As regulating agent $Na_2S_2O_5$ and Na_2S with high pH values were found to be most successful. 12 ref. (B14h; Zn, Pb)

183-B. (German.) **Refractory Problems on Remelting Furnaces.** Eduard Eipeltauer. *Neue Hütte,* v. 3, May 1958, p. 303-304.

Considerable difficulties were encountered during remelting of Zn cathode plates in low-frequency furnaces. Refractories were destroyed by the beating of the Zn bath and by frequent small explosions. Suitable refractories and burning temperature recommended. (B19c, W18; Zn)

184-B.* (Japanese.) **Concentration of Tin Ore Containing Lead and Zinc.** Tsunemasa Imaizumi, Masao Suzuki and Saburo Iwata. *Engineering Research Institute of Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 60-66.

Tin ore from Mitake mine contains Pb and Zn as highly oxidized minerals. Separation of Pb minerals from cassiterite by flotation after tabling was successful. From tabling tests cerussite and cassiterite are to be recovered as combined concentrate, and both hemimorphite and limonite as middlings and tailing. (B14; Pb, Sn, Zn)

185-B.* **A Basic Insulating Refractory.** Henry M. Harris and Hal J. Kelly. *American Ceramic Society Bulletin,* v. 37, July 1958, p. 307-311.

High-porosity, low-density basic refractories were made by a casting method in which porosity was produced by the action of phosphoric acid and ammonium lignin sulphonate on MgO. 5 ref. (B19; RMh-38)

186-B. (French.) **Ore Dressing in Luxemburg.** J. Paquet. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 121-124.

Coke rate, iron production, power balance, costs for sintering. (B13, B14, B16a)

187-B. (German.) **Flotation of Tin Pyrites and Separation From a Lead-**

Zinc Ore. Johannes Löhn. *Bergakademie;* v. 10, Apr. 1958, p. 259.

(B14h; Pb, Sn, Zn)

188-B. Treatment of Table Feed From Wattle Gully Gold Mines, Chewton, Vic. J. T. Woodcock. *Australian Scientific and Industrial Research, University of Melbourne, Ore-Dressing Investigations, Report no. 543,* Sept. 1957, 16 p.

Direct tabling recovered 62% of the Au in a concentrate assaying 45 dwt/ton. (B14; Au)

189-B. High-Tension Separation of Salt Coated Beach Sands From Kilcare, N.S.W. S. B. Hudson. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 549,* Nov. 1957, 5 p.

Sizing tests on concentrates of ilmenite, rutile and zircon. (B14; Ti, Zr)

190-B. Concentration of Beach Sand Minerals From Fraser River Area, King Island, Tasmania. S. B. Hudson. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 550,* Dec. 1957, 11 p.

Determination of recoverable rutile and zircon and treatment required to clean the mineral grains to obtain these concentrates. (B14; Ti, Zr)

191-B. Treatment of Beach Sands From Strahan, Tasmania. S. B. Hudson. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 551,* Dec. 1957, 11 p.

Concentrates prepared from each sample contained about 8% recoverable rutile, 14% zircon, 17% ilmenite and not less than 21% chromite. (B14; Ti, Zr, Cr)

192-B. (Book.) **Dispersion of Materials.** Rolt Hammond. 230 p. 1958. Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. $10.

Chapters on crushing and grinding, fluidization, flotation, liquid dispersions, atmospheric pollution. (B13, B14, B15, A8b)

193-B. (Book.) **Separation and Purification of Materials.** Rolt Hammond. 327 p. 1958. Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. $10.

Solid-solid, solid-liquid, solid-gas, liquid-liquid, liquid-gas and gas-gas systems with a chapter on separation and purification in nuclear engineering. (B14, C19, C28, A8a)

194-B.* (Italian.) **Influence of Composition of Mixes on Sintering Characteristics.** G. Sironi. *Metallurgia Italiana,* v. 50, May 1958, p. 181-190.

Study of sintering mixes based on magnetite and purple ore. A 50-50 mixture of these materials provided sinter of best strength and reducibility. Substitution of lignite for coke as fuel element impaired these characteristics. Self-fluxing sinters based on same 50-50 mix plus limestone additions gave about 10% less sinter product, as well as less satisfactory particle size and strength; however, reducibility was equal to that of product not containing limestone, and became appreciably higher as basicity was increased. Strength of self-fluxing sinter can be somewhat improved by adding rolling mill scale to sintering burden. (B16a; Fe)

195-B.* (German.) **Pelletizing Iron Ores.** Georg von Struve. *Freiberger Forschungshefte,* B25, 1958, p. 38-52.

Experiments with different materials on their suitability for pelletizing. Pelletizing equipment and processes. Agglomerating additions and roasting where simple air drying doesn't provide the necessary pellet hardness. 15 ref. (B15, B16; Fe)

196-B. Investigation of Cuyuna Iron-Range Manganese Deposits, Crow Wing County, Minn. Walter E. Lewis, Leonard F. Heising, James W. Pennington and Charles Prasky. *U. S. Bureau of Mines, Report of Investigations 5400,* 1958 49 p.

(B-general; Mn)

197-B. On the Mechanism of Hardening of Iron-Ore Pellets. A. N. Pokhvisnev and B. A. Savel'ev. *Stal',* v. 18, 1958, p. 105-109. (Henry Brutcher, Altadena, Calif., Translation no. 4161.)

Previously abstracted from original. See item 104-B, 1958. (B16b; Fe)

198-B. Metallurgical Properties of Ore-Coke Pellets. G. V. Gubin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 6, June 1957, p. 32-36. (Henry Brutcher, Altadena, Calif., Translation no. 4198.)

Properties of pellets made without application of high temperatures and pressures, by catalyst-ac-

celerated hardening in an atmosphere of carbon-dioxide-containing waste gases from industrial furnaces. Data on reducibility, softening temperature and mechanical strength.
(B16b; Fe, RM-n, RM-j43)

199-B. Mineralogic Make-Up of Fluxed Sinters. N. G. Moleva and P. S. Kusakin. *Stal'*, v. 17, 1957, p. 1068-1071. (Henry Brutcher, Altadena, Calif., Translation no. 4142.)

Effect of silica content on nature and proportions of mineral constituents; data on sinters containing 12-16%, 10-15% and about 7% silica. Crystallization of calcium ferrites. Relative strength of fluxed sinters and underlying causes; nature of cement in various sinters; effect of rate of cooling on sinter strength. (B16a; Si, Fe)

200-B.* (Russian.) **Use of Pyrite Cinder for Production of Fluxed Agglomerates of Higher Basicity.** L. Ya. Levin, N. M. Yakubtsiner and V. M. Sholenkov. *Metallurg*, v. 3, June 1958, p. 5-10.

Advantages of this method of sintering are: substantial reduction of sulphur content; increase in carbon content in charge from 3.5 to 4.8% by introduction of 25% cinder; improved gas penetration of sinter charge. (B16a, D1a; Fe)

201-B. (Russian.) **Mechanization of Preparation of Powder Material for Electro-Steel Smelting.** A. I. Sapko, V. P. Dobrov and V. D. Kucherov. *Metallurg*, v. 3, June 1958, p. 20-22.

(B16, 18-74)

202-B. (Russian.) **X-ray Studies of Phase Changes of Metal Agglomerates.** A. G. Slabchenko. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 579-582.

The agglomerate consisted of Fe_3O_4, Fe_2O_3, SiO_2 quartz and CaO. Increase of combustibles by 5% leads to formation of fayalites and to eutectoid fusion of the oxides. (B16, N9; Fe)

203-B.* (German.) **Dimensions of Flotation Cells: Effects of Dispersion and Suspension.** Werner Gruder. *Zeitschrift fur Erzbergbau und Metallhuttenwesen*, v. 11, July 1958, p. 310-319.

Flotation depends on aeration. The stirrer produces suspension by agitating the mixture and dispersion by mixing with air. The height of the flotation cell has no influence on the yield, which depends only on the aeration. The agitation increases not only with the speed of the stirrer, but is also determined by the ratio of diameter of stirrer to width of cell. (B14h)

204-B. New Process, New Plant—High Grade Iron From Inco's Concentrates. *Mining Engineering*, v. 10, Aug. 1958, p. 864-866.

Process for recovering the iron content of nickeliferous pyrrhotite. (B15, C19n; Fe, Ni, RM-n)

205-B. (Russian.) **Mining and Preparations for Smelting of Minnesota Iron Ores.** S. M. Meleshkin. *Stal'*, v. 18, July 1958, p. 593-598.

(B-general; Fe)

206-B.* (Russian.) **Properties of Fluxed Sinters.** N. L. Goldshtein and N. S. Khromchenko. *Stal'*, v. 18, July 1958, p. 586-593.

Reducibility of sinter is determined mainly by temperature and thermal level of sintering process as well as by gang content in sinter blend. These factors may be defined by the share of bivalent iron in total iron content of sinter. The usual increase in reducibility of high basicity sinter is also explained by lowering of the temperature and thermal level of sintering process when using fluxed sinter blends. Conclusions are based on study of 100 samples of fluxed sinters with varying chemical composition. 18 ref. (B16a, D1; Fe)

207-B. The Oxidation of Powder Compacts of Copper-Iron Sulphides. T. A. Henderson. *Institution of Mining and Metallurgy, Transactions, Bulletin*, v. 67, 1957-58, p. 497-520.

8 ref. (B15; Cu, Fe)

208-B. Production of Pellets From Ore Concentrates and Ore Fines. F. M. Bazanov, F. F. Kolesanov, I. L. Maikin and S. I. Sharov. *Stal'*, v. 18, no. 4, 1958, p. 289-294. (Henry Brutcher, Altadena, Calif., Translation no. 4233.)

Previously abstracted from original. See item 133-B, 1958.
(B16b; Fe, RM-n)

209-B.* Magnetic Separation. Basic Principles and Their Practical Application. P. M. Sheahan. *Australasian Institute of Mining and Metallurgy, Proceedings*, no. 186, June 1958, p. 135-159.

A system of dynamics is postulated and the forces operating are

examined, together with a method of evaluating the effect of operating variables. (B14j)

210-B.* (English.) **A Contribution to the Hydrometallurgy of Egyptian Zinc-Lead Ores. Pt. 1. Composition of Representative Samples From the Ore Body at Um Gheig.** A. R. Tourky and M. Y. Farah. *Egyptian Journal of Chemistry,* v. 1, no. 1, 1958, p. 137-146.

Sixteen samples of Um Gheig (Red Sea) smithsonite, galena and cerrusite ore were found to be of 22.9% and 4.01% Zn and Pb content respectively. Hand sorted specimens contained 45% Zn, 2-3% Pb, 17% silica and 6% CO_2. Trace metals are As, mainly from wulfenite minerals, Mo, Cd, Ge. Water samples from the Um Gheig mine, and a well 100 miles north, are analyzed. 8 ref. (B11, A4n; Zn, Pb)

211-B.* (English.) **A Contribution to the Hydrometallurgy of Egyptian Zinc-Lead Ores. Pt. 2. Variation in Composition at Different Particle Sizes.** A. R. Tourky and M. Y. Farah. *Egyptian Journal of Chemistry,* v. 1, no. 1, 1958, p. 147-152.

Varying content of Zn, Pb, SiO_2 arsenites and chlorides of ore grains ranging in size between +10 and −200 mesh studied to find right sizes for leaching and flotation. No remarkable change of Zn and Pb content in sizes above 500 microns; accentuated increase in sizes less than approximately 100 microns. No variation of chloride content with size. In general, arsenites and silica increase with smaller sizes. (B14h, C19n; Zn, Pb)

212-B.* (German.) **Zirconium-Cristobalite, a New Acid-Type Furnace Lining for the Steel Industry.** Eduard Steinhoff. *Stahl und Eisen,* v. 78, June 26, 1958, p. 893-899.

Above 1700° C. conventional linings of quarzite are short lived. Quartz-zirconium linings proved to be better in temperature resistance. Softening takes place at a load of 2 kg. per sq. mm. only between 1730 and 1780° C. Life of linings was increased 4 to 5 times. In the surface of the bricks a concentration of zirconium oxide was observed providing a high-viscosity protective layer. 11 ref. (B19d, D1, D2; ST, RM-h)

213-B. Modern Developments in Steelworks Gas Producer Practice. J. C. Martin. *Birmingham Metallurgical Society, Journal,* v. 38, June 1958, p. 76-81.

Recent developments in control of air stream and coal feeds in production of producer gas for openhearth furnaces. Gas cleaning methods. 6 ref. (B25, D2)

214-B. (French.) **Investigation of Causes of Al_2O_3 Losses During Alumina Production by the Bayer Method.** E. Magyarosy, M. Mariassy and A. Perczel. *Acta Technica,* v. 21, no. 3-4, 1958, p. 275-288.

Examination of hydrolysis in the aluminate solution using the Bayer method; reaction times in the solutions in contact with the red mud and effect of contamination of the solutions on hydrolytic decomposition. 7 ref. (B14; Al)

215-B.* (German.) **Reduction of Coke Consumption and Increased Pig Iron Output Throught Iron Ore Beneficiation.** Robert Mintrop. *Stahl und Eisen,* v. 78, May 15, 1958, p. 633-646.

Various methods for preparing iron ore burden so as to increase capacity of existing blast furnaces and reduce coke consumption. Sizing, sintering, enriching of iron ore from the Minette area, the Midlands, Sweden and the U. S. Extensive test results recorded in diagrams showing coke consumption in relation to percent of sintered ore in the burden, blast temperatures and pressures, flow resistance in relation to pellet size and percent Fe in ore or sinter. 30 ref. (B13, B14, B16; Fe)

216-B.* **Experience With Sinter Burden in Swedish Blast Furnaces.** Ulf Notini. *Iron and Steel Institute, Journal,* v. 189, Aug. 1958, p. 322-326.

Coke consumption reduced by 20 to 25% with sinter because of its improved reducibility and a fusion zone rich in iron and higher blast temperatures. Self-fluxing sinter gave coke saving of 10 to 15%. Increased output as much as 250% for charcoal furnaces and 100% for coke blast furnaces. Use of sinters sometimes increased tendency for charge to hang leading to slips. (B16a, D1a; Fe)

217-B.* (Russian.) **Pelletizing Iron Ores and Concentrates.** N. A. Yarkho. *Metallurg,* v. 3, Aug. 1958, p. 3-8.

Advantages of pelletizing over agglomeration of ores: greater gas permeability; more readily reduced; greater mechanical strength; easier

to transport. Most effective method of pelletizing is preliminary compression of the ore under vacuum and then placing in drums and roasting. This results in stronger, more uniform lumps. A chemical-catalyst method is used to enrich lumps with carbon and flux, and $CaCO_3$. (B16b; Fe)

218-B. Sintering: 5000 Tons a Day. *Metal Progress,* v. 74, Sept. 1958, p. 74-77.

U. S. Steel's new sintering plant is virtually automatic in operation. The strong porous cake provides a more effective blast furnace burden. Furthermore, the ore supply is indirectly increased because fines formerly lost are used to make the sinter. (B16a, D1; Fe)

219-B. Factors Influencing Flotation in Tin Ore Dressing. *Mining Journal,* v. 251, Aug. 29, 1958, p. 222-223.

4 ref. (B14h; Sn)

220-B.* Examination of Used Chrome-Magnesite Refractories by Petrological and X-Ray Techniques. A. G. Cockrain and W. Johnson. *British Ceramic Society, Transactions,* v. 57, Aug. 1958, p. 511-526.

Suggested that the zonary structure found in used "blue" brick results from an attempt by the brick to reach equilibrium with the composition of the average furnace atmosphere. This results in extensive chemical and mineralogical reconstruction of the brick, the hot face constitution being more or less independent of the original brick composition. This reconstruction is considered to be a major factor in brick failure. 28 ref. (B19d; RM-h)

221-B.* Instrumentation and Control in Uranium Mills. C. M. Marquardt. *Mining Engineering,* v. 10, Sept. 1958, p. 967-971.

Control systems for crushing, grinding, classifying, filtering and drying. (B13, S18, U)

222-B.* New Process, New Plant—High Grade Iron From Inco's Concentrates. *Mining Engineering,* v. 10, Aug. 1958, p. 864-866.

Following selective reduction of the roaster product in kilns using concurrent gas-solids flow, Ni is leached in ammoniacal solutions under atmospheric pressure. Permanent magnet drum separators are used for thickening in the countercurrent leaching operation and steam kettles are used to precipitate Ni from the pregnant solution. The magnetic fines are agglomerated into 1-in. balls by pelletizing on disks and firing on a traveling grate to achieve the finished product. (B14, B15; Ni)

223-B. Electric System Continuously Weighs and Proportions Materials in Jones & Laughlin's New Sintering Plant. *Industrial Heating,* v. 25, Sept. 1958, p. 1740, 1742, 1744.

(B16a, 1-52, X20; Fe)

224-B.* Fluosolids Roasting of Dowa's Yanahara Sulfides. Hidesaburo Kurushima and R. M. Foley. *Mining Engineering,* v. 10, Oct. 1958, p. 1057-1061.

Fluosolids treatment of pyrrhotite has given a profitable return on Cu, sulphuric acid and iron ore. Ore is crushed to $-\frac{1}{2}$ in. and conveyed to the ball mill. Feed and water additions to the grinding circuit are controlled so that a 70 to 75% solids slurry is produced. Two air-operated pumps deliver the feed to the 20-ft. I.D. fluosolids reactor. Roasting air is supplied to the windbox of the reactor at 7400 cu. ft. per min. and 5 psi. The dust-laden gas leaving the reactor passes through two stages of cyclone collectors, a balloon flue and a hot Cottrell for dust removal. (B15q; Cu, Fe)

225-B.* (Rumanian.) **Variation of the Flotation Indices as Function of the Duration of the Process When It Is a Question of Producing a Single Concentrate.** Huber Panu and Bujar Georgescu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 149-172.

In a previous study, Mr. Panu derived formulas for variations as function of time of two technological indices of flotation, namely, extraction of useful substance m and flotation speed w. The present work gives formulas for other technological indices: extraction of concentrate v, contents in useful substances c of the concentrate, and the yield η of the flotation. By these formulas, one can find the variation of flotation indices as a function of time if the constants of the formulas are determined by a flotation test in which the concentrate is collected in the form of one or two fractions, depending on whether the mineral is disassociated or not. 5 ref. (B14h)

226-B. British Magnesia Comes of Age. *British Steelmaker,* v. 24, Oct. 1958, p. 326-328.

The Steetley Co., Ltd., has been producing refractory magnesia from sea water and dolomite since 1937. (B19; RM-h)

227-B. Fatty Acids in Flotation. Carl Du Rietz. *Canadian Mining Journal,* v. 79, Aug. 1958, p. 81-87.

Data relating to Cu, Pb and Zn. (B14h; Cu, Pb, Zn)

228-B. (Rumanian.) **Refractory Properties of the Serpentine-Dolomite System.** Al. Braniski. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 197-215.

Study of the variation in the refractory properties of 80 different ceramic products, obtained by baking mixtures of serpentine and dolomite at 1450 or 1600° C. On the basis of the experimental results and of calculation three diagrams of refractories were drawn up and a comparison made with other diagrams and curves. 5 ref. (B19d)

229-B. Pretreatment of Uranium Ores. F. T. Davis and Glen E. Hanson. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/513, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Methods of pretreatment to improve grade include gravity separation, size preparation, flotation. Roasting and flotation are common methods used to change chemical compositions and mineralogical associations of U ores. Character of the ore is the dominant factor in selection of a process. 8 ref. (B14, B15; U)

230-B.* (German.) **Briquetting of Ore-Lime-Coke Mixtures.** Kurt Sauberlich, Gerhard Richter and Walter Zwade. *Neue Hütte,* v. 3, Sept. 1958, p. 533-541.

Experimentally pressed briquettes of iron ores and buna lime (72.03% $Ca(OH)_2$, 21.52 $CaCO_3$, 0.09 MgO, 1.78 Fe_2O_3 + Al_2O_3, 3.75% SiO_2, 0.07 S. 1.44 C; ignition loss; 28.46%, total CaO; 66.56%) and dust coke. Ore of 0-2 mm. particle size with 10% coke and 20% minimum buna lime, pressed at 500 to 700 kg. per sq. cm., gave briquettes of 70 to 80 kg. per sq. cm. Strength decreases with coarser ore particles, increased coke or decreased pressure in manufacture; can be increased by a larger amount of buna lime, by drying and heat treatment. 13 ref. (B16d; RM-n, Fe)

231-B.* (Russian.) **Influence of Oxidizing Roasting and Screen Analysis of Titanium Concentrates on Rate of Titanium Recovery.** P. F. Snezhko and I. S. Kumysh. *Stal',* v. 18, Sept. 1958, p. 808-812.

Application of preliminary oxidizing roasting of Ti concentrates makes it possible to increase rate of Ti recovery to 76.7% with corresponding reduction of Al consumption rate and improvement of alloy quality. Preliminary roasting reduces amount of iron oxide in Ti concentrates from 36 to 14%, while reducing the coke consumption per ton of ferro-titanate by 407 kg. Best results are obtained by working with concentrates 0.075 to 0.30 mm. in size. (B15n; Ti)

232-B. Investigation of Beneficiation of Iron-Bearing Sandstone. H. L. Lovell and J. W. Leonard. *Mineral Industries Experiment Station, Bulletin,* no. 71, July 1958, p. 29-35.

13 ref. (B14; Fe)

233-B. Frothing and Collecting Agents in Tin Ore Dressing. F. B. Mitchell. *Mining Journal,* v. 251, Aug. 22, 1958, p. 196-197.

Flotation in the treatment of Sn ores. (B14h; Sn)

234-B. Effect of Calcium Fluoride Additions on Sintering of Magnesium Oxide. F. Wayne Calderwood and Dave Wilder. Ames Laboratory, Iowa State College. *U. S. Atomic Energy Commission ISC-910,* July 1957, 50 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.

Additions of calcium fluoride to a particular commercial grade of magnesium oxide hastened the sintering of product when fired in an induction furnace. 40 ref. (B19c, RM-h)

235-B. New Methods of Studying the Sintering Process. V. S. Abramov. *Stal',* vol. 17, no. 3, 1957, p. 195-199. (Henry Brutcher, Altadena, Calif., Translation no. 4385.)

Previously abstracted from original. See item 111-B, 1957. (B16a; Fe)

236-B. X-Ray Study of the Mineralogic Make-Up of Sinter. A. G. Slabchenko. *Zavodskaya Laboratoriya,* v. 24, 1958, p. 579-582. (Henry Brutch-

er, Altadena, Calif., Translation no. 4407.)

Previously abstracted from original. See item 202-B, 1958.
(B16, N9; Fe)

237-B. (German.) **Concentration of the Boliden Sulphide-Ores.** Martin Winkler. *Neue Hütte,* v. 3, Sept. 1958, p. 515-523.

Complex sulphide ores (0.5-1.5% Cu, 0.2-3.0% Zn, 15-40% S) crushed and fine-crushed and floated below ground or in central plants. 4 ref.
(B14; Cu, Zn, RM-n)

238-B. High-Grade Iron Ore at Copper Cliff, Ont. Paul Queneau, E. H. Bracken and Daniel Kelly. *Journal of Metals,* v. 10, Aug. 1958. p. 527-532.

High iron content of Ni concentrates produced at Copper Cliff, Ont., Canada, was a controlling factor in Ni smelting capacity. Solution to the problem by separating an iron concentrate of low Ni and S content, with virtual elimination of Cu, precious metals and silicates, 5 ref.
(B-general, C19n; Fe, Ni)

SECTION C

NONFERROUS EXTRACTION and REFINING

1-C. Solvent Extraction Separation of Uranium and Plutonium From Fission Products. F. L. Culler and J. R. Flanary. *First Nuclear Engineering and Science Congress,* v. 2, 1957, p. 84-87.

A solution of tri-*n*-butyl in refined kerosene extracts uranium (VI) and plutonium (IV) from a nitric acid solution of irradiated uranium, leaving the bulk of the fission products in the aqueous phase. (C19; U, Pu)

2-C. Processing of Irradiated Thorium. A. T. Gresky. *First Nuclear Engineering and Science Congress,* v. 2, 1957, p. 88-95.

A method for processing the thorium blanket of a thermal breeder reactor recovers more than 99% of the thorium and U^{233} and separates them from each other and fission products by a factor of 10,000. (C28, A11p; Th, U)

3-C. Uranium Processing Using Uranium Hexafluoride. Herbert H. Hyman, Irving Sheft and Joseph J. Katz. *First Nuclear Engineering and Science Congress,* v. 2, 1957, p. 144-149.

Bromine trifluoride may be used in the preparation of uranium hexafluoride from fuel elements, ore concentrates or waste slags; dissolution and decontamination procedures. (C1p; U)

4-C. Extraction of Protactinium From Solid Thorium Fluoride. R. H. Wiswall, Jr., R. J. Heus and F. T. Miles. *First Nuclear Engineering and Science Congress,* v. 2, 1957, p. 164-169.

Removal of protactinium tracer from thorium fluoride powder by treatment with gaseous fluorine. Kinetics analyzed in terms of a solid-state diffusion process accompanied by a slow change in the properties of the solid. (C1p; Pa)

5-C. Melting and Fabrication of Binary Alloys of Uranium With Molybdenum, Niobium and Silicon. F. R. Lorenz, W. B. Haynes, E. S. Foster. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 176-185.

Vacuum induction melting and consumable electrode arc melting combined into a duplex melting technique producing sound, homogeneous alloy ingots of about 50 lb.; furnaces and accessories used. Working by extrusion, forging, rolling and swaging. (C5h, C5j, 1-73, F general; U, *Mo, Cb, Si*)

6-C. Method for the Production of Titanium-Aluminum Alloys by Reduction of Titanium Oxide. L. F. Mondolfo and A. Roy. *Light Metal Age,* v. 15, Oct. 1957, p. 11-16.

Alloy is treated with Mg or a Mg-Zn alloy to leach out the excess Al until a Ti-Al alloy of low aluminum content is obtained. Distillation removes the leaching reagent. (To be continued.) (C19n; Ti, Al)

7-C. Operation of a Pulse Column for the Production of Hafnium-Free Zirconium. J. B. Robinson and H. T. Tupper. *U. S. Atomic Energy Commission,* KT-70, May 26, 1950, 13 p. (CMA)

Hafnium thiocyanate complexes were extracted in the course of producing hafnium-free zirconium by liquid-liquid extraction at the Y-12 plant. An unpacked column 60 ft. high was considered inconvenient so a pilot study was made to shorten it. Data on the effect of pulse frequency and through-put are tabulated. (C19; Zr, Hf)

8-C. Filtration of Thiocyanic Acid Condensation Products in the Zirconium-Hafnium Separation Plant. G. R. Jansy and H. T. Tupper. *U. S.*

Atomic Energy Commission, KT-71, June 20, 1950, 10 p. (CMA)

To remove the solid condensates forming at the interfaces of extraction and scrubbing towers for the thiocyanate separation of hafnium from zirconium, a filter press was used with a choice of two filter aids. Effectiveness of the system was determined by the percentage of solids removed; diatomaceous earth is the better filter aid. (C19p, 1-52; Zr, Hf)

9-C. Induction Melting Process for Titanium Scrap. P. J. Ahearn and C. F. Frey. U. S. Watertown Arsenal, Report 10/12. *U. S. Office of Technical Services,* PB 131241, Apr. 1957, 11 p. (CMA)

A number of 20 to 25-lb. Ti ingots were prepared from Ti-6Al-4V scrap. The heats were melted in a high-frequency induction furnace under an inert atmosphere. Contamination by the graphite crucible was minimized by use of a titanium skull in the bottom of the crucible. (C5j; Ti, RM-p)

10-C. Purification by Solvent Extraction. J. M. Fletcher. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 15-33.

Three types of solvent extraction; the merits of solvent extraction compared with those of other methods; particular examples using tributyl phosphate as the organic solvent. 11 ref. (C19; RM-n)

11-C. Studies in the Chlorination of Some Complex Ores—Wolframite, Vanadinite and Chromite. E. A. Pokorny. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 34-48.

The use of varying mixtures of chlorine and hydrogen added another variant—the dissociation of the chlorides and oxy-chlorides—thus increasing the scope of chlorination and in some circumstances leading to a certain selectivity of the action of chlorine. (C19r; W, V, Cr, RM-n)

12-C. An Oxide-Chloride Conversion Process for the Extraction of Certain Metals. A. R. Gibson and J. H. Buddery. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 49-71.

A method whereby some metallic oxides may be converted to chlorides in solution in alkali or alkaline earth chlorides. A fluid melt substantially oxygen-free is generated, from which metal may be precipitated and recovered. Chemical actions involved and theory based on experiments with uranium dioxide and thoria. 5 ref. (C19r; U)

13-C. Metallurgical Developments in the Recovery of Some of the Less Common Metals in Canada. L. E. Djingheuzian. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 72-95.

Columbium, tantalum, lithium, selenium and tellurium. 28 ref. (C general; Cb, Ta, Li, Se, Te)

14-C. Extraction of Some Less Common Metals From Smelter and Refinery Intermediates at La Oroya, Peru (Selenium, Tellurium and Thallium). W. E. Koeppel and A. K. Schellinger. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 96-106.

Recovery of Se and Te from anode residue plant cupel dusts and slags under high-altitude conditions. Thallium from lead blast furnace fume traced through the cadmium plant circuit; extraction from leach solutions. Production of high-purity thallium from dichromate precipitate. (C21; Se, Te, Tl)

15-C. Recovery of Uranium From Sulphate Leach Solutions by Anion Exchange. T. V. Arden. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 119-142.

Precipitation methods proposed or tested; modern ion exchange plants. 14 ref. (C19s; U)

16-C. Factors Influencing the Magnesium Reduction of Uranium Tetrafluoride. J. Harper and A. E. Williams. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 143-162.

Experimental work for up to 5 kg. uranium. Side reactions which can influence the efficiency of the process and the quality of the metal billet. A technique which gives a high-density uranium billet. 4 ref. (C26; U)

17-C. Processes for the Extraction of Vanadium. C. Tyzack and P. G. England. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 175-195. (CMA)

Two methods studied: In one, ferrovanadium is chlorinated to VCl_4, which was separated from the other impurity chlorides, decomposed to VCl_3 and reduced by hydrogen to VCl_2; hydrogen reduction to vanadium by a fluid bed technique. The other method is the calcium reduction of the oxides under inert atmosphere. Iodine or sulphur is used as a booster. The calcium system has the greatest economic advantage. 4 ref. (C19r, C26; V)

18-C. Production of High-Purity Vanadium Metal. E. Foley, M. Ward and A. L. Hock. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 196-211. (CMA)

Theory suggests that magnesium reduction of a suitable vanadium chloride should be a sound basis for producing the metal. Ferrovanadium is chlorinated to VCl_4, decomposed in refluxing to VCl_3, and reduced in argon at 850° C. Byproducts and excess reductant are distilled off under argon and vacuum. The sponge produced is 99.7% V. 70 ref. (C26; V-a, 6-74)

19-C. Selection of Process for Development for the Production of Pure Niobium. G. K. Dickson and J. A. Dukes. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 258-271.

The chemistry of five separate processes and relative costs. (C general; Cb-a)

20-C. Extraction of Pure Niobium by a Chlorination Process. A. B. McIntosh and J. S. Broadley. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 272-286.

New process for extracting pure Cb from its ores or ferrocolumbium by chlorination and hydrogen reduction. Separation of Ta from Cb on a pilot-plant scale by preferential hydrogen reduction of the mixed Cb and Ta pentachloride. (C19r; Cb, Ta)

21-C. Distillation of Volatile Chlorides as a Means of Obtaining Pure Niobium. B. R. Steele and D. Geldart. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 287-309.

Separation of Cb from Ta, W and Fe by fractionation of their volatile chlorides is a convenient means of obtaining pure Cb which could easily be developed to a plant scale. Equipment and theory. (C22; Cb)

22-C. Beryllium Production at Milford Haven. P. S. Bryant. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 310-322.

Stages of the process from conditioning of the ore to purification of the hydroxide and recovery of beryllium from effluent liquors and slurries. Production of hydroxide-carbon briquettes and crude beryllium chloride and its purification; electrolysis of fused chloride and leaching of the cathode deposit. (C23; Be)

23-C. Preparation of Beryllium Metal by Thermal Reduction of the Fluoride. L. J. Derham and D. A. Temple. Paper from "Extraction and Refining of the Rarer Metals," Institution of Metals, 1957, p. 323-336.

Beryllium hydroxide is reacted with ammonium bifluoride and ammonium fluoberyllate is crystallized out by evaporation. The crystals are then decomposed in a graphite retort at 850° C. Ammonium fluoride is sublimed from the retort, beryllium fluoride being tapped as a molten anhydrous glass into graphite molds. The beryllium fluoride is crushed, mixed with high-purity magnesium and reduced in a graphite crucible at 900° C. The charge is heated to above 1283° C., cooled and the melted beryllium separated. 20 ref. (C1p; Be)

24-C. Purification of Metals by Intermediate Formation of Their Stable Halide Vapours With Application to Beryllium and Titanium. P. Gross and D. L. Levi. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 337-350.

Metals of which vapor pressures are too low for their evaporation at practicable temperatures may be distilled by a reversible endothermic reaction; conditions of the reactions and factors influencing purity of the distillate. Beryllium and titanium as examples. 4 ref. (C22h; Be, Ti)

25-C. Extraction of Thorium From Monazite. A. Audsley, R. Lind and P. G. England. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 351-380.

Purification processes based on chlorination and on solvent extraction of concentrates prepared from the rock by sulphuric acid breakdown. The products of these purification processes are then reduced to metal by calcium. 19 ref. (C19r, C26; Th, RM-n)

26-C. Some Investigations Into the Extraction of Titanium by Fused Salt Electrolysis. F. L. Bett, et al. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 381-401. (CMA)

Electrolysis of titanium chlorides in fused salts. $TiCl_3$ may be prepared separately or in the electrolyte; use of soluble anodes; electrolytic cell design. 17 ref. (C23n, 1-52; Ti)

27-C. The Manufacture of Hafnium-Free Zirconium. F. Hudswell and J. M. Hutcheon. Paper from "Extraction and Refining of the Rarer Metals," Institution of Mining and Metallurgy, 1957, p. 402-419. (CMA)

Separation methods, including fractional crystallization of potassium fluorozirconate and fluorohafnate, vapor-phase dechlorination, fractional distillation of alkoxides, chromatography on paper pulp or silica gel,, cationic or anionic exchange, and liquid-liquid with TBP and with methyl isobutyl ketone and HCNS. 22 ref. (C28; Zr)

28-C. Treatment of Auriferous Roasted Product From Victorian Antimony Mines, Costerfield, Victoria. J. T. Woodcock. Commonwealth of Australia, Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne, Ore Dressing Investigations Report No. 524, Feb. 1957, 24 p.

An antimony-gold ore assaying 8 dwt. per ton Au, 8% Sb, and 1% S was investigated after special roasting treatment. Best extraction of Au obtained was by direct amalgamation in absence of lime, with recovery up to 40%. Less satisfactory results were obtained by amalgamation in presence of lime, direct cyanidation, fine grinding plus agitation, cyanidation with pre-aeration or prior alkali leaching, flotation. 6 ref. (C29, C19, B14; Au, RM-n)

29-C. Treatment of Auriferous Battery Tailings From Black Cameron Mine, Queenstown, Victoria. J. T. Woodcock. Commonwealth of Australia, Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne, Ore Dressing Investigations Report No. 525, Feb. 1957, 6 p.

Sample of tailings studied contained 2.75 dwt. per ton gold and a little pyrite. No coarse gold was present and amalgamation recovered very little gold. Direct cyanidation extracted 66%; extraction could be increased to 79% by regrinding to 66% finer than 200 mesh. (C19p, C29; Au)

30-C. (Italian.) Zone Melting Method for Refining of Metals. T. Federighi. *Alluminio,* v. 26, Sept. 1957, p. 361-366.

Principles and practical considerations, including shape of specimen, length of melted zone, number of zones, rate and method of travel of zone or heat source, heating methods, specimen carriers, floating-zone technique, atmosphere. Extension of technique to homogenization and study of eutectics in complex phase diagrams; possible uses of superpure metals; zone melting as an aid to study of physical and mechanical properties of metals. 35 ref. (C28k, M24)

31-C. Separation of Zirconium and Hafnium By Differential Reduction of Their Tetrachlorides. I. E. Newnham. *American Chemical Society, Journal,* v. 79, Oct. 1957, p. 5415-5417. (CMA) (C28; Zr, Hf)

32-C. Continuous Cold Trap for Fluoride Volatility Processing of Uranium. J. C. Bresee and P. R. Larson. *Industrial and Engineering Chemistry,* v. 49, Sept. 1957, p. 1349-1354.

Enriched uranium is recovered from heterogeneous reactor fuel by low-pressure volatility process using fluidized continuous condenser. 9 ref. (C22; U)

33-C. Vacuum Dezincing of Parkes' Process Zinc Crusts. V. F. Leferrer. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Nov. 1957, p. 1459-1460. (C28, 1-73; Zn, *Pb, Ag*)

34-C. Cominco Operations. John Grinrod. *Mine and Quarry Engineering,* v. 23, Oct. 1957, p. 432-439.

Activities of the Consolidated Mining and Smelting Co. of Canada Ltd. (C general, B general; Pb, Zn)

35-C. Uranium Recovery by Continuous Countercurrent Ion Exchange. E. L. Rau. *Mines Magazine,* v. 47, Sept. 1957, p. 39-41, 59. (C19s; U)

36-C. Columnar Ion Exchange—Resin-in-Pulp — Solvent Extraction. Colorado School of Mines Research Foundation Inc. *Mining Engineering,* v. 9, Sept. 1957, p. 973.

Methods of recovering U. (C19; U)

37-C. Recent Trends in Extracting Uranium. Frederick B. Brien. *Mining Engineering,* v. 9, Sept. 1957, p. 974-975.

Preconcentration, leaching, solution purification, solution concentration, precipitation and analysis. 14 ref. (C19, B14; U)

38-C. Atmospheric Versus Pressure Leaching of Uranium Ores. R. G. Beverly, A. W. Griffith and W. A. Millsap. *Mining Engineering,* v. 9, Sept. 1957, p. 982-988.

Chemistry and flow sheet of hot sodium carbonate, sodium bicarbonate extraction; uranium-bearing solution separated from solid residue by filtration and uranium precipitated from solutions. Data from pilot plant study on effect of pressures and temperatures on percentage extraction and leach time. 10 ref. (C19; U, RM-n)

39-C. Ammonium Carbonate Pressure Leaching of Uranium Ores. B. G. Langston, R. D. Macdonald and F. M. Stephens, Jr. *Mining Engineering,* v. 9, Sept. 1957, p. 989-993.

Leaching conditions; chemistry of process; effect of temperature, pressure, oxidation, ammonium carbonate and bicarbonate concentration; advantages compared to sodium carbonate leaching. (C19n; U, RM-n)

40-C. Solvent Extraction of Uranium at Shiprock, N. M. W. C. Hazen and A. V. Henrickson. *Mining Engineering,* v. 9, Sept. 1957, p. 994-996.

Circuit and operation of plant utilizing di-2-ethyl hexyl phosphoric acid and tributyl phosphate dissolved in kerosene to extract U from acid leach liquor; uranium-laden solvent stripped with sodium carbonate solutions and carbonate solutions acidified and uranium precipitated with ammonia or magnesia. (C19; U)

41-C. Solvent Extraction. Newcomer to the Colorado Plateau. A. M. Ross. *Mining Engineering,* v. 9, Sept. 1957, p. 997-1000.

Advantages of solvent extraction for recovering U from acid leach solution; alkyl amines compared to alkyl phosphates. 12 ref. (C19; U)

42-C. Continuous Countercurrent Ion Exchange in Hydrometallurgical Separators. Clement K. Chase. *Mining Engineering,* v. 9, Sept. 1957, p. 1001-1003.

Advantages in using continuous countercurrent resin slurry operation for extraction of uranium from alkaline or acid leach liquors. (C19s; U)

43-C. Recovery of Uranium From Lignites. Edward S. Porter and Henry G. Petrow. *Mining Engineering,* v. 9, Sept. 1957, p. 1004-1006.

Pilot plant study of roasting, leaching and solvent extraction. 6 ref. (C19, B15; U, RM-n)

44-C.* Subaquatic Casting of Aluminum Ingots. Ichiji Obinata and Hiroshi Tanaka. *American Society for Metals, Transactions,* v. 51, Preprint no. 67, 1957, 23 p.

Method of making ingots by casting molten Al and its alloys in thin-walled metal molds set in hot water (SAC process). Sound ingots of fine and homogeneous equiaxed structure are obtained. While there exists no marked difference between SAC and chill ingots in the physical and chemical properties, the mechanical properties of the former are somewhat superior to those of the latter. 7 ref. (C5; Al, 5-59)

45-C.* Isolation and Separation of Niobium and Tantalum Pentoxides From Mineral Concentrates by Liquid-Liquid Extraction. G. H. Faye and W. R. Inman. *Canadian Mining and Metallurgical Bulletin,* v. 50, Oct. 1957, p. 606-613. (Also, *Transactions,* v. 60, 1957, p. 343-347.)

Methods successfully used on laboratory scale for recovery of Cb and Ta, pentoxides from concentrates of Canadian pyrochlore ores containing 3 to 20% Cb oxide and small amounts of Ta. Method uses hydrochloric nitric acid mixture for acid decomposition and extraction by means of methyl isobutyl ketone. 6 ref. (C19; Cb, Ta)

46-C.* Contribution of Ion Exchange to Nuclear Technology. L. D. Roland. *Chemical and Process Engineering,* v. 38, Sept. 1957, p. 367-371.

Description of process and explanation of chemistry of ion exchange; operation of a 3-column U extraction plant, of a resin-in-pulp extraction system; nuclear reactor water treatment methods, waste disposal technique; ion exchange process of sep-

aration of Hf from Zr and types of disposal plants.
(C19s, A8b; Zr, Hf)

47-C.* Refractories and Mould Materials for Vacuum Melting and Casting. H. O. McIntire. *Foundry Trade Journal,* v. 103, Nov. 7, 1957, p. 543-548.

Alloys that benefit particularly by vacuum melting include the Ni-base alloys (which contain appreciable amounts of Al and Ti), high-alumina iron-base alloys such as Thermenol, and certain grades of steel where the greatest possible freedom from nonmetallic inclusions is needed. Considerable success has been achieved with refractories commonly used for melting and casting in air at normal pressures. 6 ref.
(C25, D8m, 1-73; RM-h, Ni, ST)

48-C.* Removal of Lead From Copper in Fire Refining. J. E. Stolarczyk, A. Cibula, P. Gregory and R. W. Ruddle. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 49-58.

New phosphate treatment in which additions of phosphor-copper are made to the oxidized copper melt in the ratio of two parts of phosphor to one part of lead to be removed. Pb is precipitated in the melt as globules of Cu-Pb phosphate which quickly rise to the surface of the bath. 9 ref.
(C21; Pb, Cu, RM-q)

49-C.* Removal of Lead and Tin From Copper in Fire Refining. J. E. Stolarczyk and R. W. Ruddle. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 59-64.

Slags composed of silica, iron oxide and phosphorus pentoxide were efficient. Slag consisting of 70% sodium carbonate and 30% calcium oxide efficiently removed low (0.02%) concentrations of tin. Best conditions for the use of this slag. 4 ref. (C21; Cu, Pb, Sn, RM-q)

50-C. Low-Cost Method Strengthens Iron Ore Pellets. *Iron Age,* v. 180, Nov. 21, 1957, p. 130-131.
(B16b; Fe, RM-n, 6-67)

51-C.* Preparation of Uranium Metal by Fused Salt Electrolysis. G. Meister and W. C. Lilliendahl. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Nov. 1957, p. 1445-1447.

Uranium metal with a purity of about 99.9% was produced on a large scale by fused salt electrolysis with a material efficiency of about 90%. Efficiency depends mainly on bath composition, electrolysis temperature, electrode smothering and elutriation during washing of the powder. 5 ref. (C23; U)

52-C. Method for the Production of Titanium-Aluminum Alloys by Reduction of Titanium Oxide. L. F. Mondolfo and A. Roy. *Light Metal Age,* v. 15, Oct. 1957, p. 11-12, 14, 16. (CMA)

IIT method of producing Ti-Al alloys by reducing TiO_2 with Al.
(C26; Ti, Al)

53-C.* Direct Chill Casting of Large Aluminum Ingots. A. T. Taylor, D. H. Thompson and J. J. Wegner. *Metal Progress,* v. 72, Nov. 1957, p. 70-74.

Interrupted quenching is incorporated in the D. C. process to produce sound castings in sizes large enough to provide billets for huge forging and extrusion presses. A simple air blast device interrupts the flow of quenching water.
(C5, N12; Al, 5-59)

54-C.* Production of Zinc in a Blast Furnace. S. W. K. Morgan. *Metallurgia,* v. 56, Sept. 1957, p. 115-120.

Process for smelting Zn whereby furnace gases which contain 5 to 6% Zn and 8 to 10% CO_2 are brought into contact with shower of molten Pb which condenses 89% Zn vapor, allowing recovery as metal; remaining 11% recovered as dross from condenser; process useful for smelting Pb-Zn concentrates as well as high-grade Zn concentrates; Pb recovered as bullion. 13 ref.
(C21a; Zn, Pb)

55-C.* Effect of Roasting on Recovery of Uranium and Vanadium From Carnotite Ores by Carbonate Leaching. J. Halpern, F. A. Forward and A. H. Ross. *Mining Engineering,* 9, *AIME Transactions,* v. 208, Oct. 1957, p. 1129-1134.

Chemical aspects and effect of prior roasting procedures on recovery. 8 ref. (C19n, B15; U, V)

56-C. Zirconium for Nuclear Reactors. I. E. Newnham. *Research,* v. 10, Nov. 1957, p. 424-428. (CMA)

A new hafnium separation method is proposed on the basis of a differential reducibility of the tetrachlorides of the metals.
(C19r, T11q, 17-57; Zr)

57-C. Non-Aqueous Processing—an Introduction. S. Lawroski. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 479-497.

General discussion on fluoride volatility and pyrometallurgical processes. 8 ref. (C21, C22, A11d, T11g)

58-C. Fluoride Volatility Processes for Low Alloy Fuels. R. C. Vogel and R. K. Steunenberg. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 498-559.

Application of processes to irradated fuel elements consisting of natural or slightly enriched U-containing fission products and Pu of recoverable amounts. Blanket materials in the future may be of a similar nature. 11 ref.
(C22, A11d, T11q; U, Pu)

59-C. Fluoride Volatility Process for High Alloy Fuels. G. I. Cathers. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 560-575.

Development work on the fused salt—fluoride volatility process being carried out at Argonne and Oak Ridge National Laboratories. Covers fused salt dissolution and fluorination work in addition to sodium fluoride absorption as a proposed new technique for decontaminating and handling the product UF_6.
(C22, A11d, T11q; U)

60-C. Engineering and Economic Considerations of Volatility Processes. Pt. 1. Engineering. R. W. Kessie, S. Lawroski, M. Levenson, R. C. Lumatainen, W. J. Mecham, W. A. Rodger, W. B. Seefeldt, G. J. Vogel and G. E. Goring. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 576-612.

Corrosion is the predominant consideration in selecting materials; summarizes corrosion studies on the environments of the various process operations. (C22, R general, T11g)

61-C. Engineering and Economic Considerations of Volatility Processes. Pt. 2. Economics. O. J. DuTemple, W. J. Mecham and G. J. Vogel. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 613-666.

Comparison with existing solvent processes. 32 ref. (C22, A11d, T11g)

62-C. Chemistry of Pyrometallurgical Processes: A Review. Harold M. Feder. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 667-718.

Separation of U, Pu, Th, fission elements or other unwanted elements from each other in whatever combination they may occur and to whatever extent is required in connection with neutron reaction technology. 77 ref.
(C21, A11d, T11g; U, Pu, Th)

63-C. Pyrometallurgical Process; Process and Equipment Development. E. Motta, D. Sinizer, G. Brand, J. Foltz, W. Gardner, J. Ballif, J. Guon, G. Kendall, T. Luebben and K. Mattern. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 710-747.

Various furnaces for extracting fission products or Pu from molten fuel; systems related to the refabrication into fuel elements of the partially decontaminated and reconstituted fuel alloys. 3 ref. (C21, 1-52, A11d, T11g)

64-C. Pyrometallurgical Processing: Economics and Proposed Engineering Applications. J. H. Schraidt, W. A. Rodger, M. Levenson, S. Lawroski, D. C. Hampson, J. Graae, L. F. Coleman, L. Burris, Jr., G. J. Bernstein and G. A. Bennett. Paper from "Symposium on Reprocessing of Irradiated Fuels." Book 2. *U. S. Atomic Energy Commission,* TID-7534, p. 748-804.

Savings are expected by reduction of fuel inventory through rapid processing, use of simple, compact processes requiring no chemical conversion, recovery of expensive alloying agents, and simplification of waste disposal and criticality problems. 27 ref. (C21, A11d, T11g)

65-C. (French.) Preparation of Zirconium and of Some Zirconium Alloys by Fused Salt Electrolysis. Jean-Lucien Andrieux and Jeanne Dauphin. *Comptes Rendus,* v. 245, Oct. 21, 1957, p. 1359-1362. (CMA)

Only electrolytes containing $CaCl_2$ and alkali chloride such as KCl or NaCl gave zirconium in a spongelike form. 12 ref. (C23; Zr)

66-C. (French.) Manufacture of Light Alloys Plates for Stamping. Martial

Renouard and Yves Bresson. *Revue de l'Aluminium,* no. 246, Sept. 1957, p. 833-841.

A minimum isotropy is required in plates used in stamping processes. Semicontinuous casting brings about preferential orientations in the slabs. Annealing gives the required isotropy for Al-Mn alloys. With usual Al alloys, either the semi-continuous casting process must be modified or a homogenization treatment used. (C5, G3; Al, *Mn*)

67-C. (Russian.) **Iodide Method for Refining Zirconium.** G. I. Stepanova and F. I. Busol. *Atomnaya Energiya,* v. 3, Oct. 1957, p. 344-346. (CMA)

4 ref. (C1p; Zr)

68-C. (Russian.) **Separation of Titanium From Columbium With the Aid of Cationites.** S. I. Solov'ev, E. I. Krylov and L. P. Kononova. *Zhurnal Neorganicheskoi Khimii,* v. 1, Apr. 1956, p. 660-663. (CMA)

13 ref. (C19; Ti, Cb)

69-C. (Russian.) **Interaction of Oxides of Neodymium and Lanthanum With Chlorine Gas.** *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 11, Nov. 1957, p. 2606-2612. (CMA)

Importance of chlorination in metallurgical separations; some of the thermodynamic characteristics of the chlorination reaction of solid neodymium and lanthanum oxides. Equilibrium constants and changes of free energy determined. 5 ref. (C19r, P12; Nd, La)

70-C. (Book.) **Symposium on Reprocessing of Irradiated Fuels, Held at Brussels, Belgium, May 20-25, 1957, Book 2. Non-Aqueous Processing.** *U. S. Atomic Energy Commission,* TID-7534, 804 p.

Papers abstracted separately. (C general, A11d, T11g)

71-C. (Book.) **Symposium on Extraction Metallurgy of Some of the Less Common Metals Arranged by the Institution of Mining and Metallurgy, Held on Mar. 22-23, 1956.** 1957. 444 p. Institution of Mining and Metallurgy, 44 Portland Place, London, W. 1, England.

Papers abstracted separately. (C general)

72-C. Engineering Record Book—Zirconium Chloride Plant, Bechtel Corp. *U. S. Atomic Energy Commission,* TID-7005, Nov. 15, 1951, 246 p. (CMA)

(C19r, 18-67; Zr)

73-C. Solvent Extraction Equilibria for Rare Earth Nitrate-Tributyl Phosphate Systems. L. L. Knapp, M. Smutz and F. H. Spedding. Iowa State College. *U. S. Atomic Energy Commission,* ISC-766, Aug. 1956, 42 p. (CMA)

(C19a; EG-g)

74-C. Production of Pure Metals by Hydrogen Reduction of Their Salt Solutions. Tuhin K. Roy. *Indian Institute of Chemical Engineers,* v. 8, Pt. 2, 1955-1956, p. 83-94.

Equilibrium and kinetic data obtained on the precipitation of Cu, Ni and Co from their salt solutions by reduction with compressed hydrogen. (C26; Cu, Ni, Co)

75-C. (English.) **Production of Manganous Sulphate Solution Suitable for Electrolysis.** Z. Horvath. *Acta Technica,* v. 18, no. 3-4, 1957, p. 209-230.

Electrolyte prepared from Urkut washer waste containing manganese dioxide. 14 ref. (C19n, C23p; Mn)

76-C. (Italian.) **Solid Amalgam Anode for Electrolytic Extraction of Cadmium.** Giovanni Scacciati. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. I, 1957, p. 291-302.

Methods for obtaining, via cementation of Cd with a Zn amalgam, a supersaturated Cd amalgam (containing up to 21-22% Cd) which is found in solid state at room temperature. This permits manufacture of conventional solid anodes which can be used in standard electrolytic cell. High Cd content of the solid amalgam makes possible considerable savings of mercury. (C29, C23p; Cd)

77-C. Simple Method for Semi-Continuous Casting of Bronze. Pt. 1. E. C. Ellwood, J. C. Prytherch and E. P. Phelps. *Industrial Heating,* v. 26, Nov. 1957, p. 2282-2290.

Operation of machine using graphite dies in casting rods and tubes. (To be continued.) (C5q, 1-52; Cu-s, 4-55, 4-60)

78-C. Method for the Production of Titanium-Aluminum Alloys by Reduction of Titanium Oxide. Pt. 2. Evaluation of Future. L. F. Mondolfo and A. Roy. *Light Metal Age,* v. 15, Dec. 1957, p. 16-17.

6 ref. (C general; Ti, *Al*)

79-C. Practical Vacuum Treating of Nonferrous Melts at the U. S. Naval Gun Factory, Washington, D. C.

V. DePierre. U. S. Naval Gun Factory. *U. S. Office of Technical Services,* PB 131090, May 1956, 26 p. $.75.
(C5, 1-73; EG-a39)

80-C. Mechanism of Formation of Zirconium Sponge in the Magnesiothermal Production of Zirconium. F. G. Reshetnikov and E. N. Oblomeev. *Atomnaya Energiya,* v. 3, no. 5, 1957, p. 459-462. (Henry Brutcher Translation no. 4055, Altadena, Calif.)

Previously abstracted from original. See item 202-C, 1957.
(C26; Sr, 6-74)

81-C.* (Italian.) Electrolytic Extraction of Cobalt From Cobalt-Bearing Residues Produced During Electro-Extraction of Zinc. G. Scacciati. *Metallurgia Italiana,* v. 49, Oct. 1957, p. 713-720.

Multistage process terminating in electrodeposition yields high-purity metallic Co in form of deposits 6-8 mm. thick, marketable as such and not requiring further melting and casting in ingots. Work cycle and operating conditions. 7 ref.
(C23n; Co-a)

82-C. (Book.) Bibliography on Extractive Metallurgy of Nickel and Cobalt. R. B. Bauder. Bureau of Mines Information Circular 7805. 195 p. 1957. U. S. Government Printing Office. Washington 25, D. C. $.70.

1600 references covering the period January 1927 to July 1953.
(C general; Ni, Co, 11-65)

83-C. Close pH Control Eases Uranium Bottleneck. *Chemical Engineering,* v. 64, Dec. 1957, p. 151-152.

Overcoming problems of dwindling flow through RIP circuit and yellow cake filters through control of pH to an optimum range and change in method of pH adjustment prior to ion exchange. (C19s; U)

84-C.* Fractional Precipitation Processes for Liquid Metal Fuels. Robert J. Teitel. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 25-33.

Experimental data on the distribution of rare-earth tracers between precipitated uranium, intermetallic compounds and their liquid phases for U-Bi, U-Pb-Bi, U-Pb-Sn and U-Pb-Bi-Sn alloy systems. Complete fuel processing cycle proposed and tested for dispersion of U-Sn in Pb-Bi-Sn system.
(C27, T11g; U, *Bi, Pb, Sn,* 14-60)

85-C. Simple Method for Semi-Continuous Casting of Bronze. Pt. 2. E. C. Ellwood, J. C. Prytherch and E. F. Phelps. *Industrial Heating,* v. 24, Dec. 1957, p. 2532-2536.

Superior quality of rod cast by graphite die machine.
(C5q, 1-52; Cu-s)

86-C.* Effects of Crystal Orientation, Temperature, and Molten Zone Thickness in Temperature-Gradient Zone-Melting. J. H. Wernick. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1169-1173.

Experimental study of movement of Al-rich wire zone across surface of single crystals of Ge. Effect of crystal orientation, temperature and diameter of wire zone on travel. 5 ref. (C28k; Ge, Al)

87-C.* Electrolytic Preparation of Thorium Metal. B. C. Raynes, J. C. Bleiweiss, M. E. Sibert and M. A. Steinberg. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1373-1380.

Process for production of Th by fused salt electrolysis. Preparation of anhydrous oxide-free thorium chloride. Electrolysis of this salt in molten sodium chloride and removal of granular coarsely crystalline Th. Structure and mechanical properties of product Th. 30 ref.
(C23p; Th)

88-C. Dissolution of Pyrite Ores in Acid Chlorine Solutions. M. I. Sherman and J. D. H. Strickland. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1386-1388.

Apparatus and technique for measuring rate of dissolution in iron sulphide or in chlorine water. Results obtained shown only ferric ions and sulphate ions were produced and reaction is diffusion controlled with energy of activation of about 5000 cal. per mole. 17 ref.
(C19n, P13a; Fe, RM-n)

89-C. (Japanese.) Titanium Enrichment in Aluminum-Titanium Alloys by Aluminum Monochloride. Kiyoaki Obara and Fumio Mochizuki. *Light Metals (Tokyo),* v. 7. Sept. 1957, p. 5-9.

13 ref. (C19; Al, *Ti*)

90-C. For Higher Purity Metals. *Chemical and Engineering News,* v. 36, Feb. 10, 1958, p. 51-52.

Electron bombardment melting points the way to cheaper Ti, ductile Cb. (C5k; Cb, Ti)

91-C. Extracting Uranium. *Metal Industry,* v. 92, Jan. 10, 1958, p. 30-32.

Process for solvent extraction from acid leach liquors.
(C19n; U)

92-C.* (Italian.) **Contribution to the Industrial Refining of Zinc by Zone Melting.** G. Scacciati and P. Gondi. *Metallurgia Italiana,* v. 49, Nov. 1957, p. 774-782.

Theoretical limits of removal of Pb only from electrolytic Zn determined by laboratory tests. Quantities of about 100 kg. were then processed to determine optimum operating conditions, power consumption and practical limit of purity possible in industrial application. 14 ref. (C28k; Zn, *Pb*)

93-C.* **Chemical Engineering in the Nuclear Power Industry.** J. M. Kay. *Imperial College Chemical Engineering Society, Journal,* v. 10, 1956, p. 7-12.

Processes involved in extraction of U from ores and fabrication into fuel elements; processing of irradiated fuel. (C19, A11d, T11g; U, 14-70)

94-C. **Production of Hafnium. Pt. 1.** H. P. Holmes, M. M. Barr and H. L. Gilbert. *Industrial Heating,* v. 25, Jan. 1958, p. 44-50.

(C19; Hf)

95-C.* **Recovery of Nickel From Spent Nickel Catalyst.** K. E. Bharucha, J. G. Kane and D. Rebello. *Journal of Scientific and Industrial Research,* v. 16, Section A, Sept. 1957, p. 415-419.

Processes involving digestion with sulphuric, nitric, hydrochloric, formic or acetic acids. 10 ref.
(C19, A11d, T29d; Ni)

96-C.* **Uranium Recovery for Spent Fuel by Dissolution in Fused Salt and Fluorination.** G. I. Cathers. *Nuclear Science and Engineering,* v. 2, Nov. 1957, p. 768-777.

Promising nonaqueous process consists of dissolution of the fuel element in a fluoride melt by hydrofluorination at 600 to 700° C., direct fluorination for the production and volatilization of UF_6, with further decontamination of the UF_6 from fission product activity secured in an NaF absorption-desorption step. Good decontamination is obtained in the fluorination step due to the low volatility of most of the fission product fluorides. An over-all decontamination factor greater than 10^6 with adequate U recovery has been demonstrated. A pilot plant has been constructed for testing the process with various heterogeneous fuel elements. 4 ref.
(C19a, A11d, T11g; U, 14-70)

97-C. **A Critique of Vacuum Methods.** *Steel,* v. 142, Jan. 13, 1958, p. 79-81, 84.

Outstanding features of various methods of melting and specific applications. (C25, C5, D8m, 1-73)

98-C. **Production of High Purity Chromium From Fluoride Containing Electrolytes.** N. E. Ryan. *Australian Aeronautical Research Laboratories, Report Met. 26,* Jan. 13, 1958, 15 p.

Main requirements for efficient electrodeposition. 7 ref. (C23p; Cr)

99-C. **Preparation of Titanium-Aluminum Alloys by Alumino-Thermic Reduction. Pt. 1. Modified Reduction.** R. A. Sharma, A. N. Kapoor and A. B. Chatterjea. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 169-180.

7 ref. (C26; *Al,* Ti)

100-C. **Betterments in the Quality of Refined Lead.** J. S. Jacopi and B. H. Wadia. *Institution of Mining and Metallurgy, Bulletin,* v. 67, pt. 4, Jan. 1958, 20 p.

Improvements in casting technique for refined Pb ingots. 13 ref. (C5, 5-59; Pb)

101-C.* **High Purity Electrolytic Magnesium.** F. J. Krenzke, J. W. Hayes and D. L. Spell. *Journal of Metals,* v. 10, Jan. 1958, p. 28-30.

Five approaches to the impurity reduction problem: distillation of Mg metal; chemical treatment of molten metal; batch selection; chemical treatment of process liquors; changes in materials of construction of process equipment. Methods of analysis. (C19, C22h; Mg, 9-51)

102-C. **Metallurgical Problems Affecting the Economics of Aluminum Production.** Arthur F. Johnson. *Journal of Metals,* v. 10, Jan. 1958, p. 31-34.

Reduction methods and cost. (C21, C23; Al, 17-53)

103-C. **Behavior of Metals Other Than Uranium in Liquid-Liquid Extraction Processes.** C. J. Lewis and E. H. Chabtree. *Mining Congress Journal,* v. 44, Jan. 1958, p. 65-67.

Tentative conclusions indicate that metals existing in acid solution containing both anion and cation forms of the metal may be recovered by either organo-phosphate or amine liquid-liquid extraction reagents. (C19n)

104-C. **Zone Refining.** N. L. Parr. *Royal Institute of Chemistry,* Lecture no. 3, Mar. 13, 1957, 28 p.

13 ref. (C28k)

105-C. (German.) **Alkaline Electrolytic Extraction of Zinc From Tailings.** Bogumila Winsch and Wladyslaw Rutkowski. *Chemische Technik,* v. 9, Nov. 1957, p. 654-657.

Alkaline electrolysis in utilization of oxidized zinc-lead ores of low zinc content and tailings containing Zn. The final product is dendritic textured metallic powder. 6 ref. (C23p, A11d, H10b; Zn)

106-C. (Russian.) **Continuous Castings.** A. N. Myasoedov. *Liteinoe Proizvodstvo,* Dec. 1957, p. 1-3.

Method of intense cooling of ferrous and nonferrous metals so as to avoid cracks in ingot. 9 ref. (C5q, D9q, 1-67, 9-72)

107-C. Laboratory Pressure Leaching Technique. I. H. Warren. *Australian Journal of Applied Science,* v. 8, Dec. 1957, p. 317-322.

15 ref. (C19n)

108-C. Leach Licks Arsenic Bugaboo in Metal Ore. *Chemical Engineering,* v. 65, Jan. 13, 1958, p. 80-82.

Pressure leach purges As from Co ore, opens door to lower cost recovery of pure metal. Byproduct calcium arsenate and sodium sulphate add revenue. (C19n; Co, *As*)

109-C. Searching for High-Purity Silicon. *Chemical Week,* v. 82, Jan. 18, 1958, p. 55, 58, 60, 62.

Examination of old and new methods for processing Si; evaluation of the Siemens and Pechiney process. (C-general; Si)

110-C. Electrolytic Production of Titanium. H. N. Sinha and D. Swarup. *Indian and Eastern Engineer,* v. 121, Nov. 1957, p. 229-302.

17 ref. (C23n; Ti)

111-C. New Approach to Electrolytic U. L. W. Niedrach, B. E. Dearing and A. C. Schafer. *Nucleonics,* v. 16, Jan. 1958, p. 64-65.

Development of a process for continuous reduction of uranium analogous to Hall process for aluminum reduction. (C23n; U)

112-C. Amalgamation of Cyanided Concentrate From Morning Star Mine, Woods Point, Victoria. J. T. Woodcock. *University of Melbourne, Ore-Dressing Investigations,* Report no. 534, May 1957, 4 p.

Treatment of a percolation cyanide residue gave Au recovery up to 19%. (C29; Au)

113-C. (Hungarian.) **Thermodynamic Examination of Reduction of Zinc Oxide.** Zoltan Horvath. *Kohaszati Lapok,* v. 12, Mar. 1957, p. 112-119.

7 ref. (Concluded.) (C21, N15d; Zn)

114-C. (Hungarian.) **Cryolite Recovery in Aluminum Electrolysis.** Imre Molnar. *Kohaszati Lapok,* v. 12, July 1957, p. 300-311.

Methods for recovery of fluorine compounds by flotation and roasting. 21 ref. (C23n, A11c; Al)

115-C. (Hungarian.) **Thermodynamic Examination of Zinc Oxide Reduction.** Zoltan Horvath. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 32-42.

(To be continued.) (C21, P12; Zn)

116-C. (Hungarian.) **Extraction of Vanadium From Aluminum Mill Tailings.** Imre Veres. *Kohaszati Lapok,* v. 12, Apr-May, 1957, p. 181-184.

Separation of vanadium oxide by means of sulphuric acid. (C19n, A11d; Al)

117-C. Lithium Extraction From Run-of-Mine Spodumene Ore. Harold J. Andrews. *Chemical Engineering Progress,* v. 54, Jan. 1958, p. 54-55.

(C19n; Li)

118-C. Now Arc-Melting Pays Its Way in Copper. *Chemical Week,* v. 82, Jan. 25, 1958, p. 45-48.

(C5h; Cu)

119-C.* **Role of Evaporation in Zone Refining Indium Antimonide.** K. F. Hulme and J. B. Mullin. *Journal of Electronics and Control,* v. 3, Aug. 1957, p. 160-170.

Experiments include work with material heavily doped with Zn, Cd, Te and As. Several lines of evidence show that the important acceptor impurities Zn and Cd are volatile from molten indium antimonide. The removal of acceptors by volatilization under appropriate experimental conditions, followed by zone refining, can yield material with less than 10^{14} excess donors per cc. 7 ref. (C28k; In, Sb)

120-C. Recovery of Vanadium From Colorado Plateau Ores by Solvent Extraction. David A. Ellis. Dow Chemical Co. *U. S. Atomic Energy Commission,* DOW-161, Sept. 1, 1957, 51 p. (Available at U. S. Office of Technical Services, $1.50.)

(C19n; U, V)

121-C.* (German.) **Settling Behavior of Copper Matte and Copper in Liquid Slags.** F. Johannsen and W. Wiese. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Jan. 1958, p. 2-14.

Stokes' Law governs, which means that the settling speed depends on the size of the drops of the sulphides or of the Cu, on the viscosity of the slag and the difference in the specific weights between the liquid phases. Liquid Cu does not wet solid oxides and therefore forms round drops. The large drops forming in the melting of a sulphide-containing burden advance more rapidly through the layer of slag than small drops and can absorb the latter with increase in volume. 29 ref.
(C21b; Cu, RM-q)

122-C. **Second Look at Hot Salts. What Happens When a Metal Dissolves in Its Own Molten Halide?** *Chemical and Engineering News,* v. 36, Mar. 24, 1958, p. 34.

(C1p; Ni, Co)

123-C. **Preparation of Bismuth for Use in a Liquid-Metal Fueled Reactor.** G. W. Horsley. *Journal of Nuclear Energy,* v. 6, no. 1-2, 1957, p. 41-52.

Analysis of pile neutron capture cross-section (38-39 m barns) of samples of commercial refined Bi indicate that chlorine is the most deleterious impurity. Study of bismuth-oxygen-chlorine system suggests that concentration of this element may be reduced to about 13 ppm. by oxidation and filtration, the residual chlorine remaining in solution as bismuth oxychloride. 9 ref.
(C28j, P18j, T11g, 17-57; Bi)

124-C.* **Titanium Technology. Pt. 1.** R. L. Jaffee. *Modern Metals,* v. 14, Feb. 1958, p. 46-54.

Production methods, ore reserves, melting and casting. Problems involved in re-using scrap.
(C-general, A11a, A11d; Ti)

125-C. **Melting and Casting of Uranium.** N. D. Baines and E. Mason. *United Kingdom Atomic Energy Authority,* IGR.TN/C.710, Dec. 1957, 7 p.

Investigations into the production of homogeneous casts in respect to grain size and composition, casting to size, assessment of factors likely to influence grain size (including effect of ultrasonics on solidification) and prevention of contamination during melting. (C5, 1-74; U)

126-C. **Concurrent Vacuum Distillation Between Crucible Tungsten and Charge.** L. E. Preuss. Paper from *"1956 National Symposium on Vacuum Technology",* p. 127-146.

Investigation of the differential evaporation between W crucible material and Au and Cr distilland described for the empirical conditions of vacuum distillation. 31 ref.
(C22, 1-73, W18h)

127-C. **A Study of Melting and Refining Molybdenum and Columbium by the Vacuum Arc Cast Process.** E. D. Sayre and A. J. Stoph. Paper from *"1956 National Symposium on Vacuum Technology",* p. 175-181.

(C25; Cb, Mo)

128-C. **Vaccum Induction Melting.** James H. Moore. Paper from *"1956 National Symposium on Vacuum Technology",* p. 202-208.

5 ref. (C5j, D6, 1-73)

129-C. **Thermodynamics of the Vacuum-Induction Melting Process.** W. J. Pennington. Paper from *"1956 National Symposium on Vacuum Technology",* p. 209-214.

6 ref. (C5j, D6, 1-73, P12)

130-C. **Industrial Metallurgical Application of High-Vacuum for Extraction of Hydrogen From Titanium in the Solid State.** F. A. Fazzalari. Paper from *"1956 Symposium on Vacuum Technology",* p. 215-221.

6 ref. (C25, C5m; Ti, *H*)

131-C.* **Uranium Ingot Production at Atomic Energy Commission Feed Material Production Centers.** B. J. Buntz. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 17-21.

Reduction of uranium tetrafluoride to metal and melting and casting of ingots by means of vacuum induction furnace with graphite crucibles and molds.
(C1p, C5j, 1-73; U, 5-5g)

132-C.* **Melting and Casting of Uranium, Zirconium, Niobium Alloys.** J. E. Baird and N. J. Carson. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 31-37.

Vacuum induction melting and casting of uranium alloys containing 5% Zr and 1.5% Cb, into cores for nuclear reactor fuel elements. Ingot soundness, mold design and melting practice. (C5j, 1-73, T11g; U, *Zr, Cb*)

133-C.* **Arc Melting of Uranium-Rich Alloys.** W. H. Britton and W. B. Haynes. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 63-66.

Major problems in application of arc melting technique to U-Mo and U-Cb alloys include control of macrosegregation and removal of contaminants. Notes limited production use and suggests possible future developments. 4 ref. (C5h; U, *Mo, Cb*)

134-C.* **Various Methods of Preparing Uranium Dioxide for Fuel Ele-**

ment Use. C. M. Henderson, G. W. Tompkin and D. E. Rhodes. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 123-130.

Numerous chemical methods. Production of uranium dioxide from uranium hexafluoride. Effect of various physical treatments applied to uranium dioxide powders on particle size and density of sintered compacts.
(C19, C1p, H-general, T11g; U, 14-68)

135-C.* (Portuguese.) **Direct Electrolytic Refining of Black Copper.** Ivo Jordan. *ABM, Boletim da Associasao Brasileira de Metais,* v. 13, Oct. 1957, p. 287-318.

Electrolytic refining of Cu with anodes of black Cu produced by direct fusion in water-jacketed furnace, without recourse to intermediate treatment in anode furnace. Deposits of 99.99% pure Cu were obtained on starting sheets of electrolytic Cu formed by electrodeposition on stainless steel. Experiments were conducted on laboratory scale with electrodes of various compositions. Effect of voltage between electrodes, cathodic current output, characteristics of cathodes produced and of anodic slime. 8 ref. (C23p; Cu)

136-C. (Rumanian.) **Contribution to the Study of the Electrolytic Refining of Phosphorus-Nickel Alloys. I.** Atanasiu, A. Calasaru and Mira Popescu. *Revista de Chimie,* v. 9, Jan. 1958, p. 8-13.

(C23p; Ni, *P*)

137-C.* **Continuous Rod and Tube Casting.** *Metalworking Production,* Dec. 27, 1957, p. 2303-2309.

The Solicast process for continuous casting of phosphor bronze and steel rod and tube. Longer rods with uniform hardness can be produced.
(C5q; Cu-s, ST, 4-55, 4-60)

138-C. (Czech.) **Preparation of Zirconium by Reduction of Zirconium Tetrachloride and by Electrolysis of Potassium Zirconium Fluoride.** Frantisek Plzak and Vaclav Klabik. *Hutnické Listy,* v. 13, Jan. 1958, p. 26-33. 12 ref. (C23, C22j; Zr)

139-C.* (German.) **Refining of Aluminum Melts.** H. Riedelbauch. *Aluminium,* v. 34, Mar. 1958, p. 130-134.

Chlorine and nitrogen refining are effective, convenient and trouble-free if the proposed gases are replaced by salt mixtures of equivalent activity. Theory and methods of grain refining. 19 ref. (C21; Al)

140-C. (Hungarian.) **Developments in Magnesium Metallurgy.** Andor Szulyovszky. *Kohaszati Lapok,* v. 12, Jan-Feb. 1958, p. 66-70.

In countries having dolomite as a source of Mg, thermal process is more efficient and economical than electrolytic process. Thermal process is reduction of magnesium oxide at high temperature with an agent having greater chemical affinity for oxygen than Mg, such as carbon, silicon and calcium carbide. 4 ref.
(C23, C26, Mg; *C, Si, Ca*)

141-C. **Alloys From Oxides.** Nicholas Martini. *Chemical and Engineering News,* v. 30, Apr. 21, 1958, p. 59-60.

Induction furnace process for Mo, Ti, Hf, Cb, Ta, Cr and W. (C21d, 1-69; Mo, Ti, Hf, Cb, Ta, Cr, W)

142-C. **Process Refines Nickel.** *Chemical and Engineering News,* v. 36, Apr. 21, 1958, p. 60.

Direct electrolysis of Ni matte.
(C23n; Ni)

143-C. **Processing Monazite.** John Barghusen. *Chemical and Engineering News,* v. 36, Apr. 21, 1958, p. 61-62.

Process for obtaining uranium-free Th at a reasonable cost.
(C19n; Th, Ce, EG-g)

144-C.* **Vacuum Melted High-Temperature Alloys.** *Metal Industry,* v. 92, no. 4, Jan. 24, 1958, p. 63-66.

New processing technique has permitted increased operating temperatures in jet engines by its effect on high-temperature strength and ductility. Chemical composition and heat treatments for J-1570, GMR-235, Udimet 500, M-252 and Waspaloy. Tensile and stress-rupture tests; effect of B and Zr additions on rupture life.
(C25, Q27, Q3; SGA-h)

145-C. **Vacuum Melted Metals.** *Metal Industry,* v. 92, Jan. 31, 1958, p. 95-96.

Production of Ti, Zr and their alloys. (C25, Ti, Zr)

146-C. **Mechanism of Formation of Zirconium Sponge in the Magnesiothermal Production of Zirconium.** F. G. Reshetnikov and E. N. Oblomeev. *Atomnaya Energiya,* v. 3, 1957, no. 5, p. 459-462. (Henry Brutcher, Altadena, Calif., Translation no. 4055.)

Previously abstracted from original. See item 202-C, 1957.
(C26; Zr, 6-74)

147-C. (French.) **Electrolytic Separation of Hafnium and Zirconium by Means of Fused Salts.** G. Chauvin,

H. Coriou and J. Huré. *Métaux-Corrosion-Industries,* v. 23, Dec. 1957, p. 469-474.

Melting of NaCl (65%) and K_2ZrF_6 (35%) at 850° C. and electrolytic separation of Hf and Zr in an argon atmosphere. 6 ref. (C23p; Hf, Zr)

148-C.* (German.) **Industrial Experiments in the Production of Oxygen-Free Copper.** Hans Eckstein. *Neue Hütte,* v. 3, Jan. 1958, p. 32-36.

Causes of gases in electrolytic and refined Cu. Deoxidation must be performed at the same time as dehydration; deoxidizing agents. Method using charcoal filter and nitrogen as protective gas can produce Cu with oxygen content below 0.0003% and specific weight of 8.7. Another process gives oxygen-free Cu with oxygen content of 0.0002% and specific weight of 8.9. (C23; Cu-a)

149-C.* **Vacuum Melting and Heat Treating. Pt. 1.** Roger Giler. *Industrial Heating,* v. 25, Mar. 1958, p. 480-482, 484, 486, 490, 492, 494, 626.

Vacuum is produced by mercury or oil diffusion pump or a combination of diffusion ejector pumps. Vacuum is measured by McLeod gage, electrical gages, or by electron emission. Various vacuum melting furnaces and newly adopted melting processes. (To be continued.) (C25, D8m, 1-55)

150-C.* **Semicontinuous Casting of Beryllium Copper.** K. G. Wikle. *Metal Progress,* v. 73, Apr. 1958, p. 85-89.

Billets in large and small size are cast with high yield of sound, fine-grained metal, free from residual beta phase, and at a lower cost per pound than by the conventional Durville process.
(C5q; Cu, Be, 4-52)

151-C.* **Zone Melting Opens New Horizons in Metallurgy.** *Metal Progress,* v. 73, Apr. 1958, p. 97-102.

Zone melting is fast developing into an important method for metal purification. It also has other uses in research, development and manufacturing. For example, it can distribute an impurity uniformly throughout a single crystal—a problem long unsolved. (C28k)

152-C.* **Electron Beam Purifies Alloys.** *Steel,* v. 142, Mar. 24, 1958, p. 108-109.

High melting point metals (Ge, Ti, Zr, Ta, Mb, Co) purified by electron beam melting under high vacuum.
(C28, 4-73; Ge, Ti, Zr, Ta, Mb, Co)

153-C. (German.) **Significance of Electrochemistry in the Production of Metals.** Gunther Hansel. *Bergakademie,* v. 9, Oct. 1957, p. 499-512.

31 ref. (C23, L17)

154-C. (German.) **Present State of Technical Aluminum Electrolysis and Future Trends in Development.** H. Ginsberg. *Metall,* v. 12, Mar. 1958, p. 173-175.

Furnaces for current strength up to 100,000 amp. and above are mostly used. Anodes were developed in single large blocks up to 2000 kg. Progress in development of rectifiers; decrease of current density below 0.6 amp. per sq. cm. is unfavorable; further increase of current strength is possible.
(C23; Al)

155-C.* (German.) **Present Day Continuous Casting of Aluminum.** E. Hermann. *Metall,* v. 12, Mar. 1958, p. 193-197.

Equipment for continuous casting. In Germany vertical casting is mostly used. Possible defects caused by remaining gases. Unified casting-rolling process.
(C5q, 1-52; Al)

156-C.* **Leaching of Manganese From Pyrolusite Ore by Pyrite.** G. Thomas and B. J. P. Whalley. *Canadian Journal of Chemical Engineering,* v. 36, Feb. 1958, p. 37-43.

By heating an aerated slurry of ore and pyrite and recycling the leach liquor at controlled acidity to attack fresh ore, a manganous sulphate solution free of iron was obtained which, when heated to about 175° C., yielded manganous sulphate monohydrate. During the leaching process, iron in the liquor was alternately oxidized by the pyrolusite and reduced by the pyrite. In an alternative leaching procedure, the heating of an aqueous slurry of pyrite in an autoclave first under oxygen pressure and then in the absence of oxygen produced an acidic ferrous sulphate solution suitable for the subsequent leaching of pyrolusite ore at ambient temperatures. 11 ref. (C19n; Mn)

157-C. **Dawn's Uranium Plant Features Acid Extraction and Column IX.** Don Hargrove. *Mining World,* v. 20, Feb. 1958, p. 34-41.

Process of split agitation, acid extrusion of uranium from the ore,

use of column ion exchange circuit. (C19; U)

158-C.* (Italian.) **Production of Electrolytic Cadmium From Zinc Smelter Byproducts by Means of Amalgam Metallurgy.** G. Binetti and A. Vaschetti. *Metallurgia Italiana,* v. 50, Jan.1958, p. 1-7.

Process giving 99.95% pure Cd consists of three stages: leaching of cadmiferous materials with sulphuric acid; treating of leaching liquor with Zn amalgam and recovery of a Cd amalgam; electrolysis in rotating disk cells, where Cd amalgam acts as an anode, with part of its Cd content going into solution and being deposited on cathode. 14 ref. (C29, C23p, A11c; Cd, Zn)

159-C. The Hydrometallurgy of Refractory Canadian Uranium and Columbium Minerals. A. D. Pittuck, C. A. Freitag and T. V. Lord. *Canadian Mining and Metallurgical Bulletin,* v. 51, Apr. 1958, p. 228-232.
(C19n; Cf, U; RM-n)

160-C.* Arc Melting Molybdenum. George A. Timmons and Robert G. Yingling. Paper from "The Metal Molybdenum", American Society for Metals, p. 80-108.

Pressing - sintering - melting machine is capable of converting 1000 lb. of Mo powder to a cast ingot 9 in. diameter by approximately 45 in. long at the rate of 10 lb. per min. The charge is automatically compacted into a consumable electrode which is sintered by resistance heating to increase its strength and then arc melted in a water-cooled copper mold, all three operations occurring simultaneously and successively in a single vacuum system. (C5h, 1-73; Mo)

161-C.* Sintered and Arc-Melted Molybdenum Alloys. R. Kieffer and E. Pipitz. Paper from "The Metal Molybdenum", American Society for Metals, p. 530-552.

Competition between arc melting and sintering has reached an equal level, since the latter has advanced to the 100 to 300-kg. category. Sintered alloys are normally more formable than the more coarse-grained melted alloys. The latter may be rolled and swaged by using high operating temperatures (over 2900° F.) and grain-refining additives. 31 ref.
(C5h, H-general, Q23q; Mo)

162-C. (Hungarian.) Vacuum Sublimation Process for Metallic Lead. Mecsenov Petr. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 10-14.

Vacuum smelting is the most effective method for reduction of lead sulphide ores. Yield of Pb is 99%, that of Zn is 90%. Concentrated condensate may be used for lead casting. 5 ref. (C25; Pb, Zn)

163-C. Hafium-Zirconium Separation by Vapor Phase Dechlorination. J. W. Evans. *AIME Transactions,* v. 212, Feb. 1958, p. 55-56.
4 ref. (C28; Hf, Zr)

164-C. Interpretation of the Literature on the Mechanism of the Hall Process. John J. Stokes, Jr. *AIME Transactions,* v. 212, Feb. 1958, p. 75-79.

Electrolysis of Al from cryolite melts. Structure of the melts, density, freezing point. Theories of electrolysis. 18 ref. (C23, Al)

165-C. The Reduction of Cupric Salts in Aqueous Perchlorate and Sulfate Solutions by Molecular Hydrogen. E. R. Macgregor and J. Halpern. *AIME Transactions,* v. 212, Apr. 1958, p. 244-247.
21 ref. (C19; Cu)

166-C. Induction Melting Process for Titanium Scrap. P. J. Ahearn, C. F. Frey and J. F. Wallace. *AIME Transactions,* v. 212, Apr. 1958, p. 274-276.

Method employs a permanent skull in the bottom of the graphite crucible and a high meniscus during the molten period and induction-melts Ti in graphite crucibles with less carbon contamination than reported to date. 9 ref.
(C5j; Ti, RM-p)

167-C. Review and Appraisal of Vacuum Melting. Edward A. Loria. *Blast Furnace and Steel Plant,* v. 46, Apr. 1958, p. 379-384, 388.

Applications of vacuum melting to ferrous and superalloys; compares tensile strength properties of vacuum melted alloys with similar alloys melted in air. Principles, process variables, usual techniques in vacuum arc and vacuum induction melting. 6 ref.
(C25, C5h, C5j, D8m, 1-73)

168-C. Switch to Solvent Hikes Uranium Recovery. *Chemical Week,* v. 82, Mar. 1958, p. 61-62, 64.

Advantages of solvent extraction over former phosphate precipitation process are saving in reagent costs, high degree of automation possible and much higher efficiency of uranium recovery. (C19; U)

169-C. Filtration and Vacuum Distillation Unit for the Purification of Alkali Metals. G. W. Horsley. *Journal of Applied Chemistry,* v. 8, Jan. 1958, p. 13-18.

6 ref. (C19n, C22h; EG-e)

170-C. Reactor-Grade Zirconium Metal. *Nuclear Power,* v. 3, Feb. 1958, p. 73-74.

Arc melting. (C5h, T11; Zr)

171-C. NH_4F — Versatile Reagent for Zirconium Fuels. A. T. McCord and D. R. Spink. *Nucleonics,* v. 16, Feb. 1958, p. 94-104.

Scrap recovery. (C19n, A8d; Zr)

172-C. Distillation of Liquid Metal (Bismuth) Reactor Fuel. F. S. Martin and R. E. Brown. United Kingdom Atomic Energy Authority, AERE C/R 2391, 1957, 14 p.

Distillation of Bi from alloys containing Mg, Zr, U and fission products. 10 ref. (C22; Bi, *Mg, U, Zr*)

173-C. Influence of the Nature of the Gas Phase on the Anode Effect in the Electrolysis of Cryolite. Alumina Melts. A. I. Belyaev, E. A. Zhemchuzhina and A. D. Gerasimov. *Journal of Applied Chemistry of the USSR,* v. 29, no. 12, (1957), p. 1979-1983. (Translation by Consultants Bureau, Inc.)

4 ref. (C23n; Al)

174-C. Mechanism of Formation of Zirconium Sponge in Zirconium Production by the Magnetothermic Process. F. G. Reshetnikov and E. N. Oblomeev. *Soviet Journal of Atomic Energy,* v. 2, no. 5, 1957, p. 561-564. (Translation by Consultants Bureau, Inc.)

Growth of the Zr sponge on the wall of the reaction crucible above the level of the molten bath is the result of the reaction of zirconium chloride vapor with molten Mg as the latter ascends by capillary action through the previously formed sponge. The amount of zirconium chloride reacting with Mg in unit time depends more upon the perimeter of the crucible than upon the surface area of the bath. It is recommended that partitions be placed in the crucible to act similarly to the crucible wall. 7 ref. (C26; Zr)

175-C. (English.) Contribution to the Utilization of Pyrites With Low Content of Gold in the Rumanian People's Republic. G. Vanci and Gabriela Maltezeanu. *Revue de Métallurgie (Bucarest),* v. 2, 1957, p. 113-128.

The Au from pyrites with low Au content (4 to 15 g. per ton Au) can be economically extracted by the cyanide process after previous roasting at 600-700° C. With greater Au content (15 to 40 g. per ton) a two-stage cyanide process can be economically utilized. 3 ref. (C19p; Au)

176-C.* Preparation of Plutonium-Aluminum Alloys. O. J. C. Runnalls. *Atomic Energy of Canada Ltd., Chalk River Project,* AECL no. 458, June 1957, 17 p.

Direct reduction of PuF_3 and PuO_2 with liquid Al. PuF_3 is reduced more rapidly at 900° C. than at 1100° C. with liquid Al, owing to the evolution of gaseous AlF, which is stable at the former temperature. Yield for this process averaged 95% in alloying 337 g. of Pu. Alloys for a second fuel rod were prepared by the Al reduction of a pressed PuO_2-cryolite mixture at 1100° C., with a Pu yield of 98%. 7 ref. (C26; Pu, *Al*)

177-C. Atomic-Age Metal Extraction. L. W. Coffer. *Chemical Engineering,* v. 65, Jan. 1957, p. 107-122.

Chemical engineering techniques, much ignored in metal production, now solve tough corrosion, erosion, high-temperature problems in a host of new processes for making "difficult" metals. 34 ref. (C-general)

178-C. Electrolysis of Ferrous Chloride Solutions With Special Reference to Extraction of Metals and Sulphur From Sulphide Ores. V. Arvamuthan. *India Section, Electrochemical Society, Bulletin,* v. 6, July 1957, p. 49-50, 62.

(C23n)

179-C. Plutonium Recycling With Molten UF_4. Archie G. Buyers. *Nucleonics,* v. 15, Nov. 1957, p. 100-103.

Plutonium transfer from spent to fresh uranium fuel by oxidation into molten UF_4 and reduction of the fluoride mixture to U-Pu alloy has been successfully accomplished. Scaled up, the process is calculated to yield 85% of the Pu. Final alloy should contain 15-35% of the rare earths and $<$ 10% of other fission products. Suggested applications are to the sodium graphite reactor and enriched-core fast-breeder fuel cycles. 5 ref. (C28j; Pu, U)

180-C. Method for the Separation of Plutonium From Uranium. E. Haeffner and A. Hultgren. *Nuclear Science and Engineer,* v. 3, May 1958, p. 471-481.

A chromatographic method with possibilities for use on a larger scale. 5 ref. (C28; Pu, U)

181-C.* (English.) **Studies on Electrolytic Refining of Zinc. Pt. 4. Process of Inclusion of Lead in Cathode Zinc.** Motoo Watanabe and Seitaro Fukushima. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 10, Apr. 1958, p. 120-132.

Contamination of cathode Zn by the ionic deposition of Pb in solution and the occlusion of lead peroxide particle in suspension under identical conditions.
(C23p, 3-69; Bn, *Pb*)

182-C. (French.) **Method for Verifying the Purification of Aluminum by Molten Zone Refining.** F. Montariol. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 63-67.

Zone melting processes; tracer-testing of purity; low-temperature conductivity testing. 4 ref.
(C28k, P15g, S19; Al-a)

183-C.* (French.) **Separation of Rare Earths With Ethylenediamine-Tetraacetic Acid. Pt. 7. Cyclic Process for Fractionation of Cerium Earths.** G. Brunisholz and R. Cahen. *Helvetica Chimica Acta,* v. 41, Fasc. 2, 1958, p. 460-467.

Details of process, materials used. Data on separating agents rejected as inefficient. (C28; EG-g, Ce)

184-C. Continuous Rod and Tube Casting Process. *Australasian Manufacturer,* v. 43, Apr. 19, 1958, p. 84-89.
(C5q, 4-55, 4-60)

185-C. Zone Refining of Impure Copper. *Industrial Heating,* v. 25, May 1958, p. 918, 922.
(C28k; Cu)

186-C. Study of Niobium for High-Temperature Applications Through Zone Melting. *Industrial Heating,* v. 25, May 1958, p. 924-926.
(C28k; Cb)

187-C.* **UF_4 Production in Uranium Mills.** Ray S. Long, David A. Ellis and James E. Magner. *Mining Congress Journal,* v. 44, Apr. 1958, p. 74-76.

Proposal for yellow cake elimination by means of an alternative process involving two-stage solvent extraction with mono-alkyl or di-alkyl phosphate in kerosene, followed by stripping with hydrochloric acid. UF_4 is precipitated with HF.
(C19n; U)

188-C. Use of Tri-n-Octylphosphine Oxide in the Solvent Extraction of Zirconium. J. C. White and W. J. Ross. Oak Ridge National Laboratory. *U. S. Atomic Energy Commission,* ORNL-2498, Apr. 24, 1958, 37 p. (Order from Office of Technical Services, Washington 25, D. C.) $1.25.
9 ref. (C19; Zr)

189-C.* (English.) **Experiments on the Reduction of Dolomite for Magnesium Production.** T. G. Gedeon. *Acta Technica,* v. 20, no. 3-4, 1958, p. 229-250.

Laboratory and pilot plant investigation of the reduction of Hungarian dolomite by means of ferrosilicon, silicon-aluminum, aluminum, and silicon-calcium. Data on percentage yield of metallic Mg. Chemical composition, current consumption, reaction temperature and time. Higher yield with lower current consumption obtained with Si-Al than with ferrosilicon as reducing agent. 15 ref.
(C26; Mg, *Si, Al, Ca*)

190-C.* (German.) **Electrolytic Separation of Indium and Thallium.** W. Kangro and Fr. Weingärtner. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Feb. 1958, p. 70-72.

Electrolytic separation of In and Tl by means of different oxidizability of their univalent ions: (1) solution extraction of 80-90% Tl (99.94% purity); (2) extraction of remaining Tl and intermediate product (Tl with 10% In) by repeated electrolysis; (3) extraction of pure In (99.97% purity) by electrolysis.
(C23n; In, Tl)

191-C. (German.) **Reduction of Titanium Tetrachloride by Sodium-Zinc Melts.** Walter Häusler. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 206-209.

Attempt to replace mercury by zinc in Hohn's method of titanium refining. Physical and chemical fundamentals. Advantages of Zn are low cost, low vapor pressure, high dissolving ability. Disadvantage is low yield.
(C26, Ti, *Na, Zn*)

192-C. High Purity Manganese Via Electrolysis. C. H. Chilton. *Chemical Engineering,* May 19, 1958, p. 136-139.
Flowsheet. (C23p; Mn-a)

193-C. Scale-Up Problems in the Plutonium Separations Program. O. F. Hill and V. R. Cooper. *Industrial and Engineering Chemistry,* v. 50,

Apr. 1958, p. 599-602.
(C28; Pu)

194-C. Ion Exchange Separation of Uranium From Thorium. R. H. Piorier, G. D. Calkins, G. A. Lutz and A. E. Bearse. *Industrial and Engineering Chemistry,* v. 50, Apr. 1958, p. 613-616.
(C19s, U, *Th*)

195-C. Uranium Ore Reduction. The French Process. Maurice Moyal. *Nuclear Power,* no. 3/6, Mar. 1958, p. 125-127.

During extraction into pure uranium mattes, the ores undergo three stages of treatment: the concentrate is turned into sodium uranate; the uranate is processed into pure oxide; the oxide is reduced to metal. Treatment varies according to the origin, type and degree of concentration of the ores. (C19; U)

196-C. Casting and Fabrication of Natural Uranium. F. L. Cuthbert. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 29-45.

Preparation of uranium metal suitable for melting stock to produce ingots or other shapes. Recent development work involved in vacuum-induction casting, centrifugal casting and melting under a protective salt cover. Fabrication of natural uranium fuel elements by rolling, swaging and machining; heat treatment. Preparation of uranium-metal shapes utilizing powder-metallurgy techniques. (C5, F23, F25, G17, H-general, J-general; U)

197-C. Bomb Reduction, Forging, and Extrusion of Uranium and Uranium Alloys. J. A. Fellows. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 46-74.

Process for the production of pure uranium in 1.5-ton masses by a bomb reduction of VF_4 with magnesium. 26 ref. (C26; U, *Mg*)

198-C.* The Preparation of Plutonium-Aluminum and Other Plutonium Alloys. C. J. C. Runnalls. *Atomic Energy of Canada Ltd.,* AECL No. 593, Jan. 1958, 31 p.

Plutonium trifluoride is reduced more rapidly at 900° C. than at 1125° C. with liquid Al owing to the evolution of gaseous Al monofluoride at the lower temperature. Plutonium dioxide is reduced readily by an excess of liquid Al at 1200° C. in the presence of liquid cryolite, forming Pu-Al alloys with a Pu yield above 99%. 15 ref. (C26; Pu, Al)

199-C. Pressure Leaching of a Manganese Ore. Pt. 1. Kinetic Aspects. R. J. Cornelius and J. T. Woodcock. *Australasian Institute of Mining and Metallurgy, Proceedings,* no. 185, Mar. 1958, p. 65-133.
42 ref. (C19n, 3-74; Mn)

200-C. AEC Sifts Process Routes to Low-Cost Fuel Recovery. *Chemical Week,* v. 82, June 14, 1958, p. 39-44.

Purex and Redox "hot" solvent extraction processes. (C19; U)

201-C. The Production of Copper and Sulphur by the Electro-Decomposition of Cuprous Sulphide. T. P. Hoar and R. G. Ward. *Institution of Mining and Metallurgy, Bulletin,* no. 618, May 1958, p. 393-410.

Uses molten cuprous sulphide as cathode and anode and molten barium chloride as electrolyte. 17 ref. (C23; Co)

202-C. Final Treatment of Uranium Concentrates. Peter Holz. *South African Mining and Engineering Journal,* v. 69, Apr. 18, 1958, p. 649, 651.

At Calcined Products (Pty.) Ltd., Johannesburg, South Africa. (C-general; U)

203-C.* A Reconnaissance of Uranium Process Technology. Richard H. Kennedy. *Paper from "Recent Developments in Uranium Milling Technology", Uranium Institute of America,* p. 11-23.

Background of U ore processing; ion exchange process, resin-in-pulp and solvent extraction processes, outline of U concentrate processing. (C19; U)

204-C. Uranium Concentrate Specifications. Archie E. Ruehle. *Paper from "Recent Development in Uranium Milling Technology", Uranium Institute of America,* p. 25-32.

Chemical problems of refining. (C-general; U)

205-C. Recent Studies in Dapex Processing for Uranium and Amex Processing for Thorium. Keith B. Brown. *Paper from "Recent Developments in Uranium Milling Technology", Uranium Institute of America,* p. 33-43.

Solvent extraction processes. (C19; U, Th)

206-C. Continuous Ion Exchanger Treatment for Ore Leach Liquors. Irwin Higgins. *Paper from "Recent Developments in Uranium Milling*

Technology", Uranium Institute of America, p. 45-58.
(C19s; U)

207-C. Recent Developments in the Study of Uraniferous Lignite Treatment. William D. Charles. *Paper from "Recent Developments in Uranium Milling Technology", Uranium Institute of America,* p. 59-73.

Roasting, leaching, and solvent extraction. Lignite can be treated successfully with only slightly lower U recoveries than normally found, although the cost will be greater per pound of U_3O_8. (C19, B15; U)

208-C. Solvent Leaching of Uranium Ore. Richard H. Bailes. *Paper from "Recent Developments in Uranium Milling Technology", Uranium Institute of America,* p. 75-85.

Direct solvent leaching process for recovering U from carnotite-type ores using alkyl phosphate extractants (C19; U)

209-C. (English.) An Improved Process for the Caustic Soda Decomposition of Monazite. G. A. Meerson, G. E. Kaplan and T. A. Uspenskaia. *Soviet Journal of Atomic Energy,* v. 3, no. 9, 1957.
18 ref. (C19r; Th)

210-C.* Preparation of Plutonium-Aluminum Alloys. O. J. C. Runnalls. *Atomic Energy of Canada Ltd.,* AECL no. 458, June 1957, 17 p.

Direct reduction of PuF_3 and PuO_2 with liquid Al. PuF_3 is reduced more rapidly at 900 than at 1100° C. owing to the evolution of gaseous AlF, which is stable at the former temperature. Plutonium yield averaged 95%. Alloys for a second fuel rod were prepared by the Al reduction of a pressed PuO_2-cryolite mixture at 1100° C., with a plutonium yield of 98%. 7 ref.
(C26; *Al,* Pu)

211-C. Vapor Pressure of Lithium in the Reduction of Lithium Oxide by Silicon. W. Morris and L. M. Pidgeon. *Canadian Journal of Chemistry,* v. 36, June 1958, p. 910-914.
8 ref. (C26; Li)

212-C. Sodium-Reduction Route Yields Titanium. *Chemical Engineering,* v. 65, Mar. 10, 1958, p. 124-127.
(C26; Ti, Na)

213-C. Lithium: Its Extraction From Western Australian Spodumene Ore. I. J. Bear. *Chemical Engineering and Mining Review,* v. 50, Feb. 15, 1958, p. 40-46.
46 ref. (C-general; Li)

214-C.* Simultaneous Distillation of Ammonia and Separation of Copper From Nickel-Bearing Solutions. V. N. Mackiw, R. L. Benoit, R. J. Loree and N. Yoshida. *Chemical Engineering Progress,* v. 54, Mar. 1958, p. 79-85.

Various stages in the development of a process for the simultaneous distillation of ammonia and the separation of Cu from Ni, starting from laboratory work to pilot plant, and eventually to the design and operation of the commercial units. 8 ref. (C22; Cu, Ni)

215-C. Electrolysis of Ferrous Chloride Solutions With Special Reference to Extraction of Metals and Sulphur From Sulphide Ores. V. Aravamuthan. *Electrochemical Society, India Section, Bulletin,* v. 6, July 1957, p. 49-50, 62.
(C23n)

216-C. Electrons and Ions . . . Keys to Mineral Processing. James W. Franklin. *Engineering and Mining Journal,* v. 159, Apr. 1958, p. 85-87.
(C19s)

217-C.* Production of Hafnium. Pt. 2. H. P. Holmes, M. M. Barr and H. L. Gilbert. *Industrial Heating,* v. 25, June 1958, p. 1114-1126.

Commercial-grade zirconium tetrachloride is treated and purified to remove hafnium hydroxide which is dried and calcined to hafnium oxide. Direct chlorination of the hafnium oxide briquets is done in a vertical shaft, pilot-model chlorinator, with three graphite plates embedded in the lining serving as electrodes. Condenser is a cyclone type. (To be continued.)
(C28, C19r; Hf)

218-C.* Chemical Processing of Nuclear Fuels. C. M. Nicholls and R. Spence. *Institution of Chemical Engineers, Transactions,* v. 35, 1957, p. 380-393.

Concluded that there will be a need for versatility in processing plants some time to come since neither reactors nor fuel elements have become standardized. For this reason solvent extraction processes will be favored during the next few years. 6 ref. (C19, A11d, T11g; U)

219-C.* The Use of Electromagnetic Stirring in Zone Refining. J. B. Mullin and K. F. Hulme. *Journal of Electronics and Control,* v. 4, Feb. 1958, p. 170-174.

Optimum removal of an impurity during zone refining may be achieved even at high rates of

traverse by the use of stirring in the molten zone produced by a magentic field rotating at 400 cycles per sec. 9 ref. (C28k)

220-C. Mineral Processing by Chemical Methods. *Mine and Quarry Engineering,* v. 24, Apr. 1958, p. 158-163.

Aspects of the uranium milling industry. (C19; U)

221-C. New Rip Process, Solvent Extraction, Lower Concentrate Price Feature U_3O_8. H. L. Hazen. *Mining World,* v. 20, Apr. 15, 1958, p. 47-48.

Recovers dissolved U from acid slime pulp by adsorption on anion exchange resin beads.
(C19s, A11d; U)

222-C. Uranium Ore Reduction—the French Process. Maurice Moyal. *Nuclear Power,* v. 3, Mar. 1958, p. 125-127.
(C19r; C26; U)

223-C. Plutonium Recycling With Molten UF_4. Archie G. Buyers. *Nucleonics,* v. 15, Nov. 1957, p. 100-103.

Plutonium transfer from spent to fresh uranium fuel by oxidation into molten UF_4 and reduction of the fluoride mixture to U-Pu alloy has been successfully accomplished. 5 ref. (C28j, C19r; Pu, U)

224-C.* The Production of Plutonium. S. A. Butt. *Pakistan Journal of Science,* v. 9, Nov. 1957, p. 266-272.

Processes involved in the extraction of natural uranium from uraninite, carnotite, pitch-blende, autunite and torbernite ores and the separation of plutonium from the spent fuel. 12 ref. (C-general; Pu)

225-C. New Developments in the Operation of a Gold Reduction Works. A. H. Mokken. *South African Institute of Metallurgy, Journal;* v. 58, Feb. 1958, p. 307-342.

At Van Dyk Consolidated Mines, Witwatersrand, South Africa.
(C-general, Au)

226-C. (English.) Study of the Metallurgy of Antimonial Ores Bearing Gold and Silver. Pt. 2. Tatsuo Matsukawa and Toshiyuki Sakai. *Osaka University, Technology Reports,* v. 6, Oct. 1956, p. 323-327.

Effects of the concentration of KCN, CaO and other reagents on the cyanide extraction of Au and Ag. 7 ref. (C19p; Au, Ag)

227-C. (German.) Separation of Rare Earths in the Tuhomo-Genious Magnetic Field. Walter Noddack, Ida Noddack and Elisabeth Wicht. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 62, no. 1, 1958, p. 77-85.
(C28; EG-g)

228-C. (Book.) Recent Developments in Uranium Milling Technology. 1957. 105 p. Uranium Institute of America, Uranium Center Bldg., Grand Junction, Colo. $5.

Transcript of Mill Technology Symposium, May 17, 1957, Denver, Colo. Papers abstracted separately. (C19; U)

229-C. Atomic-Age Metal Extraction. L. W. Coffer. *Chemical Engineering,* v. 65, Jan. 27, 1958, p. 107-122.

Chemical engineering techniques, much ignored in metal production, now solve tough corrosion, erosion, high-temperature problems in a host of new processes for making "difficult" metals. 34 ref.
(C19, C-general, D-general)

230-C. Continuous Casting of Large Tough Pitch Copper Slabs. *Engineer,* v. 205, June 6, 1958, p. 869, 871.

"Asarco" process eliminates batch casting in costly individual metal molds by use of a small "bottomless" water-cooled graphite mold.
(C5q; Cu)

231-C. Processing Solution and Results—Guides to Your Mineral Problem. *Engineering and Mining Journal,* v. 159, Mid-June 1958, p. 65-96.

Thirty-one pages of flowsheets showing how metals are processed from their ores.
(C-general, B-general)

232-C. Recovery of Gold, Silver and Nickel From Alkaline Cyanide Solutions by Means of Weak-Base Ion-Exchange Resins. J. Aveston, D. A. Everest, N. F. Kember and R. A. Wells. *Journal of Applied Chemistry,* v. 8, Feb. 1958, p. 77-86.
(C19s; Ag, Au, Ni)

233-C. A Casting Technology for Reactive Metals. F. W. Wood, S. L. Ausmus and E. D. Calvert. *Modern Castings,* v. 34, July 1958, p. 80-86.

Equipment and practices employed in consumable-electrode, cold mold arc casting. Some cast products are illustrated and their quality discussed. Major areas of potential process improvement. 8 ref.
(C5h, 1-52; Ti, Zr)

234-C. Electrolytic Separation Studies of Nickel and Cobalt From Nicaro-

Plant Products. M. J. Ferrante, P. C. Good and P. M. Gruzensky. *U. S. Bureau of Mines, Report of Investigations 5394*, May 1958, 30 p.

Electrolytic process for recovering specification-grade Ni from either Nicaro (Cuba) pregnant liquor or basic carbonate precipitate currently in production. Nicaro products contain Ni and Co in the ratio of 64:1. 29 ref. (C23; Ni, Co)

235-C.* Sodium Reduction of Titanic Chloride. V. E. Homme, M. M. Wong and D. H. Baker, Jr. *U. S. Bureau of Mines. Report of Investigations 5398*, May 1958, 29 ref.

Reduction is performed in two steps: titanic chloride is reduced with molten sodium to titanous chloride and salt at a furnace temperature of 400 to 750° C. according to the reaction $2\ Na + TiCl_4 \rightarrow TiCl_2 + 2\ NaCl$. The lower valent Ti in this melt is then reduced to metallic Ti of high purity, at furnace temperatures of 800 to 850° C., by adding sodium to complete the requirements of the reaction $2\ Na + TiCl_2 \rightarrow Ti + 2\ NaCl$. (C1p; Ti)

236-C. Preparation of Metallic Plutonium on a Gram Scale. F. Anselin, P. Faugeras and E. Grison. *United Kingdom Atomic Energy Authority*, IGRL. T/W.63, 1958, 4 p. (From *Comptes Rendus des Sciences de L' Academie des Sciences*, v. 242, 1956, p. 1996-1998.)

Preparation of plutonium trifluoride and its conversion to Pu metal by thermal reduction with Ca. (C26; Pu, *Ca*)

237-C.* (French.) Industrial Scale Extraction and Purification of Samarium and Europium. C. de Rohden. *Energie Nucleaire*, v. 2, Jan-Mar. 1958, p. 21-28.

Description of two pieces of apparatus for continuous or semicontinuous preparation of about 1 kg. per day of oxide of samarium, and about 100 kg. per day of oxide of europium, both having purity of over 99%. Capacity of apparatus could be doubled if demand justified extraction on larger scale. (C-general, 1-52; Sm, Eu)

238-C.* Effect of Nitrogen and Vacuum Degassing on Properties of a Cast Aluminum-Silicon-Magnesium Alloy (Type 356). R. K. Owens, H. W. Antes and R. E. Edelman. *American Foundrymen's Society. Transactions*, v. 65, May 1957, p. 424-431.

The tensile properties of this alloy were insensitive to method of degassing. The effects of gas content and porosity on the ultimate and yield strength were determined for virgin and remelted heats. 11 ref. (C5m; 1-73, Al-b)

239-C. Mechanized Production of Carbon for Aluminum Smelting. *Chemical and Process Engineering*, v. 39, Mar. 1958, p. 79-81.

(C23; Al)

240-C. A New Dimension in Metallurgy. *Industrial and Engineering Chemistry*, v. 50, June 1958, p. 25A-26A.

Combination of high temperatures, utilizing electron bombardment as a heat source, with ultrasonic vacuum results in metals of extremely high purity. (C25, 1-73, 1-74)

241-C.* The Oxidation Rates of Lump Copper-Iron Sulphides. T. A. Henderson. *Institution of Mining and Metallurgy, Bulletin*, no. 619, June 1958, p. 437-462.

The rates of oxidation in atmospheric air of lump FeS, Cu_2S and a number of mattes have been measured for roasting temperatures above 600° C. Oxide layers formed most rapidly on Cu_2S and mattes of very high Cu content and most slowly on mattes containing about 66% Cu. Reduction in the activation energy of the oxidation process occurred with increase in Cu content of the matte above 40%. 12 ref. (C21, N15, N16; Cu)

242-C. Study of the Electrolytic Production of Nickel From Chloride Electrolytes. N. P. Fedotyev and Z. I. Dmitreshova. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 227-237. (Translation by Consultants Bureau, Inc.)

16 ref. (C23n; Ni)

243-C. Tantalum, Niobium and Beryllium. G. L. Miller. *Metal Industry*, v. 92, June 20, 1958, p. 507-509.

Methods of extraction and refining. (C-general; Ta, Be, Cb)

244-C. Methods of Uranium Recovery in the U. S. A. *Mining Journal*, v. 250, June 13, 1958, p. 693.

Resin-in-pulp and solvent extraction processes. (C-general; B14, U)

245-C.* New Refining Process Purifies Refractory Metals. Stanley H. Dayton. *Mining World*, v. 20, July 1958, p. 40-43.

The process utilizes electron bombardment of impure metal stock

In a furnace under a vacuum of 10^{-7} atmospheres. Electron bombardment melts the stock. Impurities are boiled from the melt if the vapor pressure of contaminating compounds exceeds a pressure of about 10^{-5} atmospheres.
(C28, 1-73; Be-a, Ti-a, V-a, Zr-a, Cb-a)

246-C. Treatment of Gold-Tin Concentrate From the Astronomer Mine, Russell River Goldfield, North Queensland. J. T. Woodcock. *University of Melbourne, Commonwealth Scientific and Industrial Research Organization, Ore-Dressing Investigations,* Report no. 540, July 1957, 31 p.

(C-general; Au)

247-C. (German.) **Fusion Electrolysis in an Aluminum Plant.** G. Lange. *Elektro-Wärme,* v. 16, Mar. 1958, p. 87-90.

(C23; Al)

248-C.* (French.) **Contribution to the Problem of the Continuous Cyaniding of Gold Ores.** R. Badescu and Gh. Vanci. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 121-126.

Advantages of using a larger number of cyaniding tanks of smaller capacity is brought out with the aid of mathematical computation.
(C19p; Au)

249-C. (English.) **Separation of Lanthanum From Other Cerium Earths.** P. J. Reddy, D. V. N. Sarma and Bh. S. V. Rhagnava Rao. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, Mar. 25, 1958, p. 426-435.

4 ref. (C28; La)

250-C. (German.) **Welding Rectifiers for Arc Melting of Titanium and Zirconium.** E. Bergmann. *Elektrowärme,* no. 1/2, Jan-Feb. 1958, p. 38-39.

Metals with a high melting point which are highly reactive when in contact with gases are vacuum melted by means of an electric arc. Welding rectifiers are used as power supply units, and, where necessary, several units are controlled in parallel. Usual practice is to operate one controlled unit and then three noncontrolled units, each with a rating of 2500 amp, in parallel. 3 ref. (C5h, W29a; Ti, Zr)

251-C. (German.) **Reduction of Metal Chlorides With Aluminum.** H. Balduin. *Monatshefte für Chemie,* v. 88, Jan. 28, 1958, p. 1038-1047.

21 ref. (C26; *Al*)

252-C. (German.) **Experiments in Electrolytic Separation of Metallic Chromium From Chromic Salt Solutions.** Susumu Morioka and Hideki Yamaoka. *Technology Reports of the Tohoku University,* v. 22, 1957, p. 121-127.

6 ref. (C23n; Cr)

253-C. (German.) **Spectroscopic Examination of Vaporization of Binary Alloys.** E. Saur and E. Unger. *Zeitschrift für Naturforschung,* v. 13 a, Feb. 1958, p. 72-79.

Melts of binary alloys were vaporized at constant temperature and condensed in several separated fractions. Weighing of the condensates and spectroscopic examination of their compounds made the experimental determination of the separation during the process of vaporization possible. 15 ref. (C22, S11k)

254-C. (Italian.) **On the High Degree of Purification of Aluminum, Uranium and Iron by the Zone Melting Method.** P. Albert. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 136-142.

Zone melting techniques. Results of analysis and physical examination of state of purity. Examples of new properties obtained through the extreme degree of purification achieved. 19 ref.
(C28k; Al-a, Fe-a, U-a)

255-C. (Italian.) **Purification and Preparation of Germanium and Silicon.** S. E. Bradshaw. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 143-148.

Methods of preparation examined from theoretical and practical points of view. The zone melting method is the most suitable for obtaining the required degree of purity.
(C28k; Ge, Si)

256-C. (Italian.) **Theory and Practice of Zone Melting.** G. Baralis. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 149-156.

Zone melting for obtaining high purity, such as required for Ge and Si for use in electronic tubes. Zone melting apparatus and numerous applications of the method. 120 ref. (C28k; Ge, Si)

257-C. (Japanese.) **Preparation of Indium Antimonide.** Ryoji Takahashi. *Engineering Research Institute of Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 97-100.

Indium antimonide prepared by melting and zone melting in argon gas. (C28k; In, Sb)

258-C.* **Experiments to Establish Conditions for the Continuous Reduction of Titanium Tetrachloride to the Metal by Sodium.** J. Smolinski, J. C.

Hannam and A. L. Leach. *Journal of Applied Chemistry,* v. 8, June 1958, p. 375-386.

Titanium tetrachloride was reduced continuously to the metal by sodium dissolved in fused chlorides; Ti metal of hardness down to 180 D.P.N. was extracted from the reactor without interrupting the process of reduction. 8 ref. (C1p; Ti-a)

259-C.* Pouring Semi-Continuous Cast Ingots. R. A. Jones and V. Kondic. *Metal Industry,* v. 93, July 4, 1958, p. 3-5.

Characteristics of the casting process for light alloys and Cu-base alloys, emphasizing the hot top method. (C5q; EG-a 38)

260-C.* Indium Purification and Production of an InSb Compound With High Electron Mobility. V. M. Sergeeva and E. L. Shtrum. *Soviet Physics, Technical Physics,* v. 2, no. 12, p. 2507-2510.

Vacuum distillation removed metallic impurities. Electrolysis then removed oxygen and silicon, resulting in 99.9% pure In ingots. 13 ref. (C23, C25; In)

261-C. (French.) **Hydrometallurgical Extraction of Nickel From Rumanian Ores.** Alexandru Lupu and Ana Boiangiu. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 77-106.

11 ref. (C19n; Ni)

262-C. (German.) **Oxidation of Antimony in Dry Lead Refining.** Joachim Barthel. *Bergakademie,* Dec. 1957, p. 630-632.

(C28j; Pb, Sb)

263-C. (German.) **Physical Purification of Germanium.** Gerhard Raabe. *Chemische Technik,* v. 10, Apr. 1958, p. 203-207.

3 ref. (C28; Ge)

264-C. (German.) **Direct Reduction of Lead Sulphide.** E. J. Kohlmeyer and H. Brinkmann. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 292, Dec. 1957, p. 275-286.

By blowing hydrogen and air on fusible lead sulphide a practically complete reduction to metallic lead is possible. 11 ref. (C26; Pb)

265-C.* Low-Pressure Way to High Purity Tantalum. *Chemical Week,* July 19, 1958, p. 97-98, 100, 102.

Ingots of up to 110 lb. turned out by high-vacuum furnace have good ductility, low Brinell hardness. (C25, Q-general, 1-73; Ta)

266-C. Gold Distribution in Cyanided Sulphide Concentrate From Wattle Gully Gold Mine, Chewton, Vic. J. T. Woodcock. *Australian Scientific and Industrial Research Organization, University of Melbourne, Ore-Dressing Investigations, Report no. 546,* Oct. 1957, 5 p.

Sample of cyanided concentrate contained 2.48 dwt/ton gold, of which 0.08 dwt/ton was dissolved Au. (C28; Au)

267-C. Vanadium. J. Lomas. *Canadian Mining Journal,* v. 79, July 1958, p. 90-92.

Methods of recovery; properties; applications. (C-general; V)

268-C. Aluminium Reduction Plant at Baie Comeau, Que. C. Miller and W. G. Street. *Engineering Journal,* v. 41, July 1958, p. 41-49.

Canadian British Aluminium Co. smelter. (C-general; Al)

269-C. I.C.I. Titanium Project. *Industrial Chemist,* v. 34, July 1958, p. 365-366.

Arc melting of compacted Ti powder electrodes in a water-cooled copper crucible at the Imperial Chemical Industry's Metals Division plant, Witton, Birmingham, and fabrication of sheet and rod at the Waunarlwydd plant. (C-general, F-general; Ti-b)

270-C. Extraction and Recovery of Some Rarer Metals. *Mining Journal,* v. 251, July 4, 1958, p. 12-13.

Methods of extracting Mo, Ta, Cb and W. (C-general; Mo, Ta, Cb, W)

271-C. The Common Element Is Zinc. *Oilways,* Aug. 1958, p. 13-19.

Zinc production at the Zinc Smelting Division, St. Joseph Lead Co., Josephtown, Pa. (C-general; Zn)

272-C. Electrolytic Production of the Four-Component Alloys Nickel-Iron-Molybdenum-Manganese and Nickel-Iron-Molybdenum-Copper. T. F. Frantsevich Zabludovskaya, and K. B. Kladnitskaya. *Journal of Applied Chemistry of the USSR,* v. 30, Mar. 1957, p. 423-428. (Translation by Consultants Bureau, Inc.)

12 ref. (C23, Ni, Fe, Mo, Mn, Cu)

273-C. The Iodide Method of Refining Zirconium. G. I. Stepanova and F. I. Busol. *Soviet Journal of Atomic Energy,* v. 3, 1957, p 117-1181.

(C1p; Zr)

274-C. (German.) **Sb Distribution in Chilled Ge-Sb.** Georg Prörst and Gotthold Zielasek. *Zeitschrift für Angewandte Physik,* May 1958, p. 201-204.

Preparation of Ge semiconductors with Sb impurities.
(C-general; Ge, Sb)

275-C.* Production of Discaloy by Vacuum Arc Melting. D. R. Carnahan. *Metal Progress,* v. 74, Aug. 1958, p. 100-102.

Discaloy is now being produced by the consumable-arc process. Problems solved during development of the commercial melting method.
(C5h, 1-73; SGA-h)

276-C. Vacuum Melting Today. *Metal Progress,* v. 74, Aug. 1958, p. 94-99.

Vacuum is being increasingly used in processing steels and superalloys for today's most stringent applications. Appreciable amounts of active elements can be added as alloying agents; gases and inclusions are reduced. The user has available a number of vacuum-produced alloys and more are in the offing.
(C25, C5, D8m, D9, 1-73)

277-C. On Vacuum Alloys. On Superheating of Alloys. D. S. Kamenetskaya. Paper from "Problems of Metallography and the Physics of Metals", *U.S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 39-41. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Substances can be melted in a vacuum which have a pressure at the triple point lower than the pressure corresponding to the given vacuum. Mg, Zn, Cd and Mn cannot be melted in a vacuum at a pressure equal to or lower than 10^{-2} mm. Hg. Al can not only be melted in a vacuum, but can be heated in a liquid state to considerable temperatures whereas Mg, Mn, Cd and other substances evaporate long before the melting temperature, corresponding to atmospheric pressure, is reached.
(C5, 1-73; Cd, Al, Mg, Mn)

278-C.* (French.) Production of Calcium by Dissociation of Its Carbide. Louis Hackspill and Nicole Platzer. *Comptes Rendus,* v. 246, May 28, 1958, p. 2969-2972.

Calcium carbide undergoes thermal dissociation under vacuum. Above 1500° C. the parting of metallic vapor is rapid enough to carry with it a large proportion of free carbon. This impurity can be separated by filtering the vapor through a porous graphite plate. The calcium can then be condensed and the resultant product has a free carbon content of less than 0.6%. 6 ref. (C27; Ca)

279-C. Uranium Milling Technology. S. W. F. Patching. *Mine and Quarry Engineering,* v. 24, Aug. 1958, p. 356-363.

Summary of papers on uranium process technology; concentrate specification; Dapex and Amex processing; ion exchange treatment of ore leach liquors; uraniferous lignite treatment; solvent leaching of U ore; stockpiling of nuclear fuel. (C-general; U)

280-C. The History of the Melting of Platinum. Donald McDonald. *Platinum Metals Review,* v. 2, Apr. 1958, p. 55-60.

(C5, A2; Pt)

281-C. (Czech.) Production and Properties of Ag-CdO Pseudo-Alloy. Vladimir Volejnik and Josef Bican. *Hutnicke Listy,* v. 13, 1958, p. 571-576.

Production of silver cadmium oxide pseudo-alloy by means of internal oxidation at various temperatures and with various Al-Cd alloys prepared by common foundry processes. Such alloy exhibited high microhardness of oxidized layer in a finer more regular distribution of cadmium oxide in base material than pseudo-alloys prepared by powder metallurgy.
(C-general, R2s; Cd, Ag)

282-C. (Rumanian.) Manufacture of Lead-Sodium Alloys by Electrolysis of Sodium Hydroxide. Al. Turassy and M. Fruchter. *Revista de Chimie,* v. 9, Apr. 1958, p. 203-206.

4 ref. (C23n; Pb, Na)

283-C. Chloride Volatilization of Oxidized Lead Ore From Eureka, Nev. A. L. Engel and H. J. Heinen. *U. S. Bureau of Mines, Report of Investigations 5409,* 1958, 7 p.

High extractions of Pb, Au and Ag resulted from treatment of an oxidized, arsenical refractory ore by chloride volatilization. The ore was roasted in an oxidizing atmosphere at 1000° C. for 1 hr. The chloridizing reagent was 300 lb. of $CaCl_2 \cdot 2H_2O$% ton of ore. 99% of the Pb, 98% of the Au, and 96% of the Ag, and only 6% of the As were volatilized. (C19r; Pb, Au, Ag)

284-C.* (French.) Continuous Casting and Its Problems. G. Wilz and M. Petitdidier. *Revue de Metallurgie,* v. 55, May 1958, p. 486-494.

Continuous casting installations of the world and their relative importance. The four-mold installa-

tion at Denain. Advantages of continuous casting and problems to be solved. A formula is established for calculating in advance the economic advantages attainable with such an installation. 34 ref. (C5q, D9q)

285-C.* (Hungarian.) **Extraction of Contaminating Salts in the Bayer-Process and Utilization of Alkaline Salts.** Adam Juhasz. *Kohaszati Lapok,* v. 91, Apr. 1958, p. 161-168.

Removal of vanadium pentoxide, phosphorus pentoxide, sodium carbonate and caustic soda by leaching with lye. V_2O_5 and CaO are recovered. (C19n; Al)

286-C.* (Hungarian.) **Current Efficiency of Aluminum Reduction Plants.** Szakal Pal. *Kohaszati Lapok,* v. 91, Apr. 1958, p. 173-179.

Efficiency of modern furnaces is 85-90%. Each per cent improvement in efficiency increases the world product about 40,000 tons. Factors affecting efficiency are temperature, actual distance between the electrodes, current density, chemical composition of the electrolytes, physical and mechanical composition of the cathode and physical state of anode. 54 ref. (C23n; Al)

287-C.* (French.) **Uranium Manufacturing Cycles.** Michel Brodsky. *Energie Nucleaire,* v. 2, Apr-June 1958, p. 110-115.

Steps in typical process used in France. Aspects of British, Belgian and U. S. processes. (C-general; U)

288-C.* (Russian.) **Utilization of Low-Grade Manganese Ores for Production of Ferromanganese and Silicomanganese.** E. M. Alekseev. *Stal',* v. 18, July 1958, p. 617-620.

It is technically possible and economically expedient to produce ferromanganese and silicomanganese from carbonaceous and low-grade oxide manganese ores in electric furnaces. Reserves of carbonaceous ores are in many regions three times as high as oxide ores. (C21d; Mn, AD-n, Fe)

289-C. **Causes of Difficult Stripping of Cathode Zinc Deposits.** V. L. Klimenko. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 569-579. (Translation by Consultants Bureau, Inc.)

Difficult stripping in the industrial electrolysis of zinc sulphate solution refers to the abnormal increase of the force required to separate the cathodic Zn deposit from the Al cathodes owing to adhesion between them. (C23p; Zn)

290-C.* **Electrorefining of Titanium From Binary Alloys.** J. R. Nettle, T. E. Hill, Jr., and D. H. Baker, Jr. *U. S. Bureau of Mines, Report of Investigations 5410,* 1958, 11 p.

Seven alloys of Ti with 5% Mn, V, Al, Cr, Sn, Zr and Mo examined to determine efficiency of Ti separation under controlled conditions. (C23p; Ti)

291-C.* (German.) **Maximum Oxidation of Antimony in the Dry Lead Refining Process.** Joachim Barthel. *Freiberger Forschungshefte,* no. B28, June 15, 1957, p. 36-39.

Research results show that maximum oxidation of Sb in Pb is dependent upon high degree of oxidation of Sb_2O_3, which is a function of Sb content in metal phase, temperature and solubility. (C28j; Pb, Sb)

292-C.* (German.) **Cadmium Precipitation From Solutions Obtained From Leaching Zinc Ores.** Klaus Hein. *Freiberger Forschungshefte,* no. B28, June 15, 1957, p. 40-41.

During Cd ion oxidation-reduction process in Zn electrolytes in the presence of Cu, an accelerating and a retarding reaction occur. Accelerating effect is due to increased adsorption of Cd ions on activated Cu-Zn surface; retarding effect is caused by metals with low, irreversible hydrogen potential (Cu, Ag) which repress Cd precipitation due to increasing hydrogen evolution. Metals with high irrversible hydrogen potential (Sn, Hg, Cd) have a small retarding effect on speed of Cd reduction. Metals which either accelerate or retard Cd precipitation process can therefore be predicted. (C23; Cd, Zn)

293-C. (Polish.) **Mechanism of the Cathode Process in the Metallurgy of Aluminum.** Leszek Suskiy. *Wiadomosci Chemiczne,* v. 10, no. 3, 1956, p. 141-159.

Theoretical bases of electrolytic production of Al with special reference to the mechanism of the cathode process. It is not established definitely whether Al is extracted during an electrode reaction directly or the extraction is due to some secondary processes. (C23p; Al)

294-C.* Preparation of Titanium-Aluminum Alloys by Alumino-Thermic Reduction. Pt. 2. By Use of Energisers. R. A. Sharma, A. N. Kapoor and A. B. Chatterjea. *Indian Institute of Metals, Transactions,* v. 11, June 1958, p. 89-99.

Energizers such as barium peroxide or potassium chlorate were utilized to produce higher temperatures and to increase the Ti content in the alloy. Amount of energizer necessary to obtain suitable temperature (2200° C.) was calculated. Variation of aluminum and barium peroxide additions, and admixture of various amounts of calcium oxide and of the particle size of the Al and rutile were studied to ascertain the optimum conditions for the reduction of rutile. 6 ref. (C26; Ti, *Al*)

295-C.* Studies on Vanadium and Titanium Bearing Iron Ore of Mayurbhanj. R. K. Mitra and G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 111-121.

Mineral described contains about 60% Fe, 13.6% TiO_2; 2.3% SiO_2 and other insolubles; 1.26% V_2O_5 and traces of P and S. Magnetic separation at different grades was resorted to followed by mineralogical examination of the fraction thus obtained. Reduction treatments of the ore in the solid state by coal gas and also by finely powdered charcoal at 950 and 1050° C. were studied. Reduction by gas at 1050° C. was found most suitable. (C26, B14j; Fe, *V, Ti*)

296-C.* Preparation and Electrolysis of Titanium Trichloride. H. N. Sinha and H. K. Worner. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 123-133.

Titanium trichloride can be electrolyzed in suitable molten salt mixtures to produce Ti. Method for preparing trichloride by reducing tetrachloride with hydrogen on a hot silica surface. The trichloride thus produced has been dissolved in a carrier electrolyte consisting of a eutectic of LiCl/KCl and electrolyzed at 550° C. to yield metal powder of purity and ductility comparing favorably with Kroll sponge. 24 ref. (C23p, H10b; Ti)

297-C.* Production of Some Less Common Metals by Fused Salt Electrolysis. R. K. Mangal and H. N. Sinha. *Indian Institute of Metals, Transactions,* v. 11, June 1958, p. 101-107.

Fused salt electrolysis offers good opportunities for the production of Be, Th, U and Zr. Problems include: proper cell design because most of the baths have to be electrolyzed in an inert atmosphere; techniques of consolidating the metal crystals on the cathode; necessity of finding suitable refractory materials for the construction of the cell. 25 ref. (C23p; Be, Th, U, Zr)

298-C.* Electrolytic Recovery of Antimony From Battery Wastes. B. B. Dey, V. Aravamuthan and P. R. Rajagopalan. *Journal of Scientific and Industrial Research,* v. 17A, June 1958, p. 240-242.

The Pb-Sb alloy obtained by melting battery wastes is first subjected to electrorefining in a fluoborate bath to yield anode mud containing 85-90% Sb and 10-15% Pb. Electrolysis is carried out using Monel metal cathodes and graphite as anode. Deposits are bright, adherent and of high purity. (C23p, A11d; Sb, Pb)

299-C. (Russian.) **Reasons for Formation of Zinc Sponge Upon Cathodes of Zinc-Containing Electrolytes at Currents of Low Densities.** N. T. Kudryavtsev, R. Yu. Bek and I. F. Kushevich. *Trudy Moskovskogo Khimiko-Tekhnologicheskogo Instituta,* v. 22, 1956, p. 137-142.

Mechanism of Zn-sponge formation on a cathode, at low current densities, in Zn-containing electrolytes and, in particular, the part played by anodes and ions of nobler metals and oxidizing agents. When electrolysis is carried on with insoluble anodes (Pt and Ni) the sponge is formed only at the upper part of cathode near the boundary of the electrolyte with air; when electrolysis is carried on with Zn anode the sponge is formed over the whole surface. (C23; Zn)

300-C. (Russian.) **Electrolysis of Melted Manganese Slag.** O. A. Yesin, G. A. Toporishchev and P. M. Shurygin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, 1957, p. 85-91.

Electrolysis of melts of $MnO-SiO_2$, $MnO-CaO-SiO_2$ and $MnO-Fe-Si_2$ were studied in a magnesite cell with a cathode of Ag or Fe-Mn alloy and a graphite anode at 1250 to 1500° C. Faraday's law is valid for both electrodes at the optimum parame-

ters of the process. (C23; Mn, RM-q)

301-C. A New Approach to the Synthesis of Metallic Hydrides. S. Ramamurthy. *Indian Institute of Metals, Transactions,* v. 11, June 1958, p. 81-88.

Gravimetric, vacuum dissociation and metallographic data indicate that a complex titanium-aluminum hydride ($TiH_2.3AlH_3$) is formed when a Sn-Al-Ti alloy powder is treated in hydrogen. 5 ref. (C19; Ti, Al, Sn)

302-C. Electron Beam Melting. *Metal Industry,* v. 93, Aug. 29, 1958, p. 176.

Heat for melting is supplied by an electron gun which serves as the cathode and bombards the melt stock (the anode) with electrons, heating it to the melting point. Molten metal drops into a water-cooled Cu crucible below. Ta, Mo and other metals have been produced of higher purity than ever known before. (C5; Ti, Ta, Zr, Mo)

303-C. A Rationale for the Recovery of Irradiated Uranium and Thorium by Solvent Extraction. T. H. Siddall. *Second United Nations International Conference on the Peaceful Uses of Atomic Energy.* A/CONF.15/P/521 U. S. A., June 1958, 24 p.
4 ref. (C19n; U, Th, 14-70)

304-C.* Production of Thorium Compounds. J. J. Barghusen and M. Smutz. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 54-69.

Principal methods for the recovery of Th from monazite, including the Ames monazite, the Battelle and the Brazilian processes. Alternative methods outlined are separation by precipitation, liquid-liquid extraction, ion-exchange, and electrolysis. 23 ref. (C-general; Th)

305-C.* Preparation of Thorium Oxide and Thorium Fluoride From Thorium Nitrate. Ray W. Fisher. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 70-77.

Operating technique used in the digestion of thorium nitrate and the precipitation and filtration of thorium oxalate; calcination of thorium oxalate; hydrofluorination of thorium oxide. (C19; Th)

306-C.* Development of the Thorium Tetra-Fluoride-Calcium Process for Thorium Metal. H. A. Wilhelm. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 78-103.

Main reactants are thorium tetrafluoride and calcium, and the charge contains an additive which brings about the formation and separation of the metal in massive form as the product of the reduction step. A subsequent melting and casting operation is employed to obtain Th ingots for fabrication into useful shapes. (C1p; Th)

307-C.* Consumable-Electrode Arc Melting of Thorium. A. H. Roberson and Robert A. Beall. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 114-123.

Consumable-electrode cold mold arc melting is an efficient method for preparing sound, homogeneous ingots for extrusion or forging from Ti sponge or electrolytic powder. Electrodes may be formed by cutting sponge into suitable shapes and welding them into suitable sizes, or by pressing the sponge into briquets that later are joined by welding. Th powder compresses into electrodes which usually require vacuum sintering to remove adsorbed gases. (C5h; Th)

308-C.* Direct Smelting of the Rich Sulfide Ore of Lead With Pyrite Cinder and Coke. Pt. 1. Tatsuo Matsukawa and Seiji Tokumoto. *Osaka University, Technology Reports,* v. 7, Oct. 1957, p. 399-402.

Lead sulphide ores smelted with pyrite cinder, coke and lime in muffle furnace. The sponge iron produced by the reduction acts as a desulphurizing agent. Yield of Pb is about 77%. 4 ref. (C21; Pb)

309-C. Principles Underlying New Highly Productive Methods of "Complex" Chemical Treatment of Polymetallic Iron Ores. D. P. Bogatsky and G. G. Urazov. *Academy of Sciences of the USSR, Bulletin,* no. 8, 1957, p. 933-941.

Simple and effective methods proposed for chemical refinement and treatment based on theoretical scheme of reduction-oxidation-reduction. 11 ref. (C19; Fe)

310-C. Avonmouth Zinc Blast Furnace Demonstrates Its Versatility. S. W. K. Morgan and S. E. Woods. *Engineering and Mining Journal,* v. 159, Sept. 1958, p. 95-99.
(C21a; Zn)

311-C. Liquid-Liquid Extraction of Uranium From Aqueous Solutions. E. H. Crabtree and C. J. Lewis. *Engineering and Mining Journal,* v. 159, Sept. 1958, p. 102-108.
(C19s; U)

312-C. Preparation of Iodide Thorium. N. D. Veigel, E. M. Sherwood and I. E. Campbell. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 104-113.

The relatively low as-deposited strength of iodide thorium places a limitation on the size of the crystal bars that can be produced. Large-diameter starting filaments will be required for production of large-diameter crystal bar unless conditions can be established for the formation of more coherent deposits. (C1p; Th)

313-C. Electrolytic Refining of Thorium. Robert A. Noland. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 124-132.

Purified product was deposited as a mass of discrete crystals on a Mo cathode. (C23; Th)

314-C.* Separation of Niobium and Tantalum by Liquid Extraction. Ernest L. Koerner, Jr., Morton Smutz and Harley A. Wilhelm. *Chemical Engineering Progress,* v. 54, Sept. 1958, p. 63-70.

Acid dissolution of columbite, leaching with hexone, separation of Cb and Ta with hexone, oxide conversion and solvent recovery of oxides. 9 ref. (C19; Cb, Ta)

315-C.* (French.) **Dissolution of Uranium From French Ores by Oxidizing Attack.** A. Graire. *Energie Nucleaire,* v. 2, Apr-June 1958, p. 116-119.

Dissolution of U from pitchblende ores is generally accomplished by oxidizing sulphuric attack, oxidizing agent containing either pyrolusite, ferric sulphate, nitrates or chlorates. In all cases, ferric sulphate appears to be intermediate compound of the solubilization reaction. Previously used methods of leaching ash appear to be directly applicable today in U recovery. For U as well as for Cu, duration of leach, temperature of solution, concentration in Fe^{+++} are principal factors determining reactions of dissolution. (C28j; U)

316-C.* (French.) **Manufacture of Aluminum Conductor Wire by the Properzi Process at the St. Jean-de-Maurienne Plant of the Pechiney Co.** Andre Crevot and J. C. Beguin. *Revue de l'Aluminium,* July-Aug. 1958, p. 751-756.

Properzi machine produces wire rod directy from molten Al. Metal is poured into triangular throat of casting wheel and rough rod obtained moves continuously through a 13-stand rolling mill. Wire is wound in 2250-lb. coils by specially designed double coiler, reducing butt welding requirements before wire-drawing operations. Improvements in metallurgical control and process conditions at this installation have eliminated need for heat treatment of coiled rod, and in case of rod made of "Almelec", cracks formerly developed during solidification of rough stock and subsequent rolling no longer appear. (C5q, 1-52, F28; Al)

317-C.* (French.) **Process for Purification of Solutions of Plutonium Nitrate and Preparation of Metallic Plutonium.** S. Chambers and T. G. Hughes. *Energie Nucleaire,* v. 2, July-Sept. 1958, p. 202-206.

Plutonium nitrate solution, separated by extraction with dibutyglycol from solution obtained by dissolution of uranium bars, is concentrated by evaporation and purified by extraction with a mixture of tributyl phosphate and kerosene. Residual impurities from reagents and apparatus can be eliminated by a second purification in glass equipment. Nitrate solution is concentrated: nitrate is transformed into an oxide, then a fluoride, and finally into metal by reduction by calcium or magnesium. Impurities, which represent less than 1% by weight, are composed of Fe, Ni, Cr and U. 4 ref. (C-general; Pu)

318-C. Separation of Tantalum-Columbium by Solvent Extraction. K. B. Higbie and J. R. Wearing. *U. S. Bureau of Mines,* July 1956, 53 p.
(C19, Cb, Ta)

319-C.* (Rumanian.) **Extraction of Nickel From Minerals of the RPR by the Hydrometallurgical Method. Ammoniacal Process.** Al. Lupu and Ana Boiangiu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 75-105.

Survey of work done from 1952 to 1954 for exploiting serpentines. Use of the ammoniacal process which is generally applicable to basic gangue minerals. Influence of degree of crushing, temperature and duration of roasting, addition of substances favoring reduction and degree of Ni

extraction, concentration of the washing solution, relation between solution and the material subjected to washing, duration of washing process. Variations of the process for extraction of magnesium oxide. 11 ref. (C19; Ni)

320-C.* (Rumanian.) **Contributions to the Problem of Continuous Cyanidation of Auriferous Minerals.** R. Badescu and Gh. Vanci. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 173-195.

From mathematical analysis of the process of continuous cyanidation, the following conclusions can be drawn: (1) The quantities of insufficiently cyanided mineral are smaller for installations incuding a higher number of reservoirs with smaller partial volumes. (2) Exceeding a certain output limit leads to insufficiently cyanided quantities of mineral, which are higher for installations with reservoirs of smaller dimensions. (C19p; Au)

321-C.* (Slovenian.) **Utilization of Nickel-Bearing Serpentines and Silicate-Oxide Ores in Nickel Production.** Krsto Cazafura, Joze Zakrajsek and Janex Wohinz. *Rudarsko Metalurski Zbornik,* no. 2, Summer 1958, p. 147-168.

Experiments with ores of 0.18 to 1.40% NiO, 0.0001 to 0.099% CoO, 6.68 to 57.35% Fe_2O_3, 0.80 to 5.54% FeO, 0.12 to 0.37% MnO, 1.33 to 3.35% Cr_2O_3, 2.27 to 2.30% Al_2O_3, 0.52 to 3.50% CaO, 5.98 to 38.13% MgO, 0.16 to 1.15% Na_2O, 0.20 to 0.47% K_2O, 17.78 to 49.53% SiO_2, 0.30 to 0.65% S, 0.14% SO_2, 0.33% P_2O_5, 0.002 to 0.006% As_2O_3, 0.20 to 1.64% CO_2, concerning the possibility of concentration by mechanical, hydromechanical and magnetic separation showed negative results. (C-general; Ni)

322-C. **Chemicals in Ore Processing—a Fifty-Year Review.** Raymond E. Byler. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, pt. 1, p. 50A-53A.

Hydrometallurgy, leaching, flotation. (C19, B14h)

323-C. **Separation of Uranium and Thorium.** S. V. Suryanarayana and B. H. S. V. Raghava Rao. *Scientific and Industrial Research Journal,* v. 17B, Aug. 1958, p. 310-312.

Simple and direct ion-exchange method suggested. Both elements are absorbed by the resin (Amberlite IR) from which U can be eluted first with 1.70*N* hydrochloric acid. 6 ref. (C19s; Th, U)

324-C. **Some Experiments on the Fused Salt Processing of Liquid Metal Fuels.** J. K. Higgins. *United Kingdom Atomic Energy Authority, AERE M/M 194,* 1958, 7 p.

Reaction between a fused sodium, potassium, magnesium chloride eutectic and a liquid bismuth solution containing small amounts of cerium (100 ppm. by wt.) and uranium (1000 ppm. by wt.). Experimental results for the transfer of Ce and U from the metal to the salt phase in a silica container. It is concluded that contamination from this container presents serious difficulties to an electrolytic method for the processing of liquid metal fuels. 15 ref. (C23p, T11g, U, Bi, Ce)

325-C. **Precipitation of Thorium as Thorium Hydride From Thorium-Magnesium Solutions.** Paul F. Woerner and P. Chiotti. Ames Laboratory, Iowa State College. *U. S. Atomic Energy Commission, ISC-928,* Aug. 1957, 42 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

The extent to which thorium can be precipitated from the Th-Mg solutions as the dihydride was determined by reacting purified hydrogen gas at 1 atm. pressure with the liquid metal solutions. 14 ref. (C27; Th, Mg)

326-C. **Methods and Operations at the Yerington Copper Mine and Plant of the Anaconda Co., Weed Heights, Nev.** M. Clair Smith. *U. S. Bureau of Mines, Information Circular 7848,* 1958, 37 p.

The exploration, development, equipment and mining of a large, oxidized-copper ore deposit by open-pit methods, the leaching of the ore with sulphuric acid solution and recovery of the Cu as cement copper. 6 ref. (C19n; Cu)

327-C. **Remelting of Steel and Alloys in Vacuum Arc Furnace.** G. N. Okorokov, A. Yu. Polyakov and A. M. Samarin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, May 1958, p. 59-62. (Henry Brutcher, Altadena, Calif., Translation no. 4339.)

Experiments on the removal of gases and nonmetallic inclusions from steels and alloys by remelting in a vacuum arc furnace. (C25, D8m, W18s, 1-73; ST)

328-C.* (French.) **Use of Copper as a Cation Exchanger in the Separation**

of Rare Earths by Ion Exchange With the Help of Ethylene-Diamino-Tetraacetic Acid. J. Loriers and C. Lenior. *Comptes Rendus,* v. 247, July 28, 1958, p. 468-471.

Improvements are that rare earths in complex solution with EDTA acid can be selectively fixed on a resin saturated with Cu^{2+} ions; efficient separation is obtained with EDTA acid by means of a ring of Cu^{2+} cations in columns; Cu salt solutions of EDTA acid can be used as eluents. 6 ref. (C19s; EG-g, *Cu*)

329-C.* A Review of the Extractive Metallurgy of Niobium. M. E. Sibert, A. J. Kolk, Jr., and M. A. Steinberg. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 20-34.

Chemical reduction of oxides and halides such as Cb_2O_5, K_2CbOF_5, K_2CbF_7 and $CbCl_5$ has been conducted with varying degrees of success. Aqueous electrochemical reduction has not yet yielded a metallic deposit. The electrolysis of molten baths containing K_2CbOF_5 or K_2CbF_7 has produced Cb metal. The more promising methods of preparation of Cb metal at the present include reaction of Cb_2O_5 with C, the H_2 and active-metal reduction of $CbCl_5$, and electrolysis of K_2CbF_7-NaCl melts. 71 ref. (C19, C23p; Cb)

330-C.* Recent Developments in Separating Tantalum and Niobium by Solvent Extraction. Joan L. Tews and Sherman L. May. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 36-43.

Application of the solvent extraction system, hydrofluoric acid-sulphuric acid-methyl isobutyl ketone, will yield more than 90% of the contained Ta and Cb values free of each other and free of other metallic impurities irrespective of the Ta-to-Cb ratio in the starting material. 7 ref. (C19; Ta, Cb)

331-C.* Investigation of Electrolytic Processes for Preparation of High Purity Niobium Metal. A. J. Kolk, M. E. Sibert and M. A. Steinberg. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 44-53.

Direct electrolysis of molten K_2CbF_7-alkali halide mixtures using an inert graphite anode. High-purity, cold ductile metal has been produced by this type of electrolysis under a variety of experimental conditions. A second process is the electrorefining of an impure Cb, prepared by a high-vacuum high-temperature reaction of the pentoxide (Cb_2O_5) with carbon. Difficulty has been experienced with respect to hydrogen being carried over to the cathode deposit. (C23p; Cb-a)

332-C.* The Removal of Gaseous Impurities by Vacuum Arc Melting. Stanley J. Noesen. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 150-156.

Pressure of noncondensable gases in consumable electrode arc melting measured by utilizing hollow Mo electrode. A pressure differential of 3000 microns was maintained between arc zone and furnace body with a gas evolution of 1200 microliter per sec. with the ratio of cross-sectional areas of electrode to crucible being 0.17. Mo alloy with 0.5% Ti was sintered and arc melted to determine degree of purification obtainable in this equipment. Oxygen was reduced from 780 ppm. to 4 ppm.; nitrogen from 190 to 6 ppm.; hydrogen from 130 to 0.5 ppm. and carbon from 420 to 120 ppm. (C25; Mo-b)

333-C.* What Vacuum Melting Process Shall I Use? A. M. Aksoy. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 168-176.

Basic principles, advantages and limitations of vacuum induction melting, vacuum arc melting and vacuum degassing processes. Vacuum induction melting used for production of high-quality products relatively small in size and where compositions must be closely controlled. Vacuum arc remelting suitable for large forging and quality products of less critical nature. Vacuum degassing primarily used to reduce hydrogen content of steel. 17 ref. (C25, D8m)

334-C.* (Japanese.) Extraction of Uranium Metal. S. Tarara. *Metals,* v. 28, Oct. 1958, p. 763-766.

U is separated by thermal dissociation, reduction of oxides and halide, and fusion electrolysis. The first method can produce high-purity U but is not suitable for mass production. The last method is applicable for UCl_4, UF_4 and KUF_5; mass production is possible but

washing, desiccation, preservation and dissolution are not easy. The second method is applicable for UCl_4 and UF_4, but UCl_4 is not treated easily. Reduction of UF_4 by Ca or Mg is the most familiar method and can produce high-purity U at high efficiency. (C-general; U)

335-C. SX Line Wins Uranium From Variety of Ores. C. H. Chilton. *Chemical Engineering,* v. 65, Aug. 25, 1958, p. 104-107.

Solvent extraction plus modified ore-sampling and preparation yield uranium process dividends for Vitro Uranium Co. (C19; U)

336-C. Timken Goes to Vacuum Melting. *Iron Age,* v. 182, Oct. 23, 1958, p. 64-65.

Use of a consumable electrode vacuum arc furnace.
(C5h, T7d, 1-73; ST)

337-C. Bacterial Leaching of Manganese Ores. E. C. Perkins and F. Novielli. *Mining Congress Journal,* v. 44, Aug. 1958, p. 72-73.

15 ref. (C10n; Mn)

338-C. Solvent Extraction of Uranium. *Mining Magazine,* v. 99, Aug. 1958, p. 78-84.

Studies made by Vitro Corp. Solvent extraction or liquid ion-exchange as metallurgical processes for recovery of metals. (C19s; U)

339-C. Effect of Antimony on the Oxidation of Liquid Lead. E. Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, Jan. 1956, p. 17-25. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1473.)

Previously abstracted from original. See item 106-C, 1956.
(C5; Pb, Sb)

340-C. Pryometallurgical Purification of Plutonium Reactor Fuels. J. A. Leary, R. Benz, D. F. Bowersox, C. W. Bjorklund, K. W. R. Johnson, W. J. Maraman, L. J. Mullins and J. G. Reavis. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/529, 1958, 14 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Experiments were conducted on Fe-Pu fissium and fissium prepared from 12 at. % Co-Pu base alloy melting at 410° C. Liquation and filtration, carbide slagging, halide slagging, electrorefining, recrystallization from Hg and liquid-liquid metal extraction discussed. 6 ref. (C-general, T11g, 17-57; Pu)

341-C. Methods and Equipment for Low Decontamination Processing of Metallic Nuclear Fuels. G. E. Brand, D. I. Sinizer, E. W. Murbach, W. N. Hansen, J. R. Foltz and K. L. Mattern. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1780, 1958, 22 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Reprocessing of Th and Th-U alloys. Methods currently under investigation are arc melting, drip melting, electrolysis. 8 ref.
(C-general, A11d; Th, U)

342-C. Recent Developments in Plutonium Processing in the United States. R. D. Baker and J. A. Leary. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1830, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Processing methods are either aqueous or pyrometallurgical. The former includes solvent extraction (Redox and Purex processes), ion exchange and precipitation. The latter includes liquation and filtration, drossing and slagging, recrystallization, liquid metal extraction, fused salt conversion and fused salt electrorefining. 16 ref. (C19, C23; Pu)

343-C.* Electroplating and Electrorefining of Metals From the Sulphamate Bath. T. L. Rama Char. *Electroplating and Metal Finishing,* v. 11, Oct. 1958, p. 343-346.

Possibilities in India for electrorefining and electrowinning of metals, particularly Ag and Pb from battery wastes.
(C23n, C23p, A11d, L17a; Ag, Pb)

344-C.* Production of Ductile Niobium. O. P. Kolchin, N. V. Sumarokova and N. P. Chuveleva. *Soviet Journal of Atomic Energy,* v. 3, no. 12, 1957, p. 1397-1406. (Translation by Consultants Bureau, Inc.)

Production of powder containing 98.9 to 99.2% Cb by reduction of potassium fluocolumbate (K_2CbF_7) with sodium and production of ductile Cb by sintering in vacuo small bars pressed from this powder. Methods of producing ductile Cb by the carbothermic process. 20 ref. (C26, H10c; Cb)

345-C. Electrorefining of Vanadium, Chromium, Zirconium and Hafnium. D. D. Blue and D. H. Baker. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/698, 1958, 17 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Electrorefining technique consists of transfer of treated metal from an anodic electrode via a molten-salt electrolyte to the cathode, where the product is deposited as a solid. Design of equipment, properties of the electrolyte, operating variables are major factors controlling transfer characteristics and product quality. (C23p; V, Cr, Zr, Hf)

346-C. A Continuous Electrolytic Process for the Preparation of Beryllium Metal. R. B. Holden, M. C. Kells and C. I. Whitman. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/717, 1958, 7 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Preparation of an amalgam of Be by electrolyzing a NaCl-$BeCl_2$ fused salt mixture into a mercury cathode. Be in amalgam form is suitable for direct hot compaction to produce dense Hg-free Be. (C23p; Be)

347-C. Melting and Fabrication of Zircaloy. E. L. Richards, J. H. Hart, W. H. Friske and W. J. Hurford. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1010, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Double, consumable electrode, arc melting process. Fabrication has been accomplished by almost all of the known metalworking processes. Wire of all gages has been produced by drawing a rod formed by hot rolling or extrusion; cups have been spun, deep drawn, flow turned, back extruded and impact extruded. Shapes have also been cast using a special vacuum melting and casting technique. 6 ref. (C5h; F-general, G-general; Zr-b)

348-C.* (German.) **Manufacture of High-Purity Nickel.** Konrad Georgi and Eberhard Merkel. *Neue Hütte,* v. 3, Sept. 1958, p. 553-561.

Experiments on the precipitation of metallic impurities in the electrolytic refining of Ni using hydrogen sulphide and freshly prepared, fine-powdered iron sulphide. The latter substance gave best results, precipitating Pb, Sn, Bi, Cd and Cu at the same time. 19 ref. (C27, C23p; Ni-a)

349-C.* (German.) **Electrolysis of Titanium Chloride in Melted Salt Mixtures.** Shinzo Okada, Makoto Kawane and Tomoyasu Hashino. *Zeitschrift für Electrochemie,* v. 62, no. 4, 1958, p. 437-441.

Experiments with titanium chloride in mixtures of LiCl-KCl and NaCl-KCl. The polarogram of TiCl ($2.3\text{-}10^{-4}$ mol. % of the mixture, at 400° C.) shows two upturns, the first reaches at approximately −0.9 volts E_k a summit of approximately 3.5 microns A, then the curve declines and starts to rise again at approximately −1.1 volts E_k. The $TiCl_4$ polarogram rises more uniformly. Anodic polarogram for $TiCl_3$ illustrated. 13 ref. (C23p, C1p; Ti)

350-C. Extraction of Plutonium From Neutron-Irradiated Uranium by Uranium Trichloride and Magnesium Chloride. D. E. McKenzie, W. L. Elsdon and J. W. Fletcher. *Canadian Journal of Chemistry,* v. 36, Sept. 1958, p. 1233-1240.

11 ref. (C6; Pu, U)

351-C. Transistor-Grade Silicon. Pt. 1. Preparation of Transistor-Grade Silicon Tetraiodide. B. Rubin, G. H. Moates and J. R. Weiner. *Electrochemical Society,* Abstract no. 65, May 1957, p. 138-141. (C1p; Si)

352-C. Transistor-Grade Silicon. Pt. 2. Zone Purification of Silicon Tetraiodide. G. H. Moates and B. Rubin. *Electrochemical Society,* Abstract no. 66, May 1957, p. 142-143. (C28k; Si)

353-C. Contribution to the Floating Zone Technique for Refining Silicon. E. Buehler. *Electrochemical Society,* Abstract no. 68, May 1957, p. 144-151.

Two operations, recrystallization and boron removal, are carried on simultaneously in the automatic floating zone refiner. (C28k; Si, *B*)

354-C. An Ion Exchange Approach to Molybdic Oxide. Howard Cox and A. K. Schellinger. *Engineering and Mining Journal,* v. 159, Oct. 1958.

Low-grade molybdenite ore processed to recover over 90% of Mo as either MoO_3 or $CaMoO_4$ in laboratory experiments. (C19s; RM-n, Mo)

355-C. Uranium Adsorption From Leach Slurries. Paul Noble, Jr., W. I. Watson, I. M. Whittemore, R. A. Carlson, J. C. Huggins and L. A. McClaine. *Industrial and Engineering Chemistry,* v. 50, Oct. 1958, p. 1513-1516.

(C19n; U)

356-C. An Arc Furnace for Zone Refining Metals. G. A. Geach and F. O. Jones. *Metallurgia,* v. 58, Oct. 1958, p. 209-210.

Use of furnace in which metal to be melted is held in a water-cooled Cu hearth while heated by an arc from an inert electrode overcomes difficulty of contamination from the containing vessel in zone refining the more refractory or reactive metals. (C28k, X24f)

357-C. Studies of Electrolytic Refining of Zinc. Pt. 4. Process of Inclusion of Lead in Cathode Zinc. Motoo Watanabe and Seitaro Fukushima. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, 1958, p. 120-132.

A comparison was made with the Pb content of Zn deposited on two cathodes in the same cell, of which one was enclosed in an unglazed cylindrical alumina diaphragm and the other was directly immersed in an electrolyte suspending a reasonable amount of lead peroxide particles. An electrolyte solution was forcibly circulated through the diaphragm to prevent growth of difference between the solution constituents, especially the Pb ion concentration, of both sides of the diaphragm. Distribution of the Pb between the ionic Pb deposition and the occlusion of lead Pb peroxide particle was determined by comparing the results from these two cathodes. (C23n; Pb, Zn)

358-C. Periodic Reduction in Particle Size of Aluminum Hydroxide During the Process of Decomposition of Aluminate Solutions. S. I. Kuznetsov. *Tsvetnye Metally,* v. 29, no. 9, 1956, p. 62-67. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-20K20R.)

(C23; Al)

359-C. Entrainment Studies on Solvent Extraction of Uranium From Heavy Slurries. D. A. Ellis, R. S. Long and J. B. Byrne. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/497, 1958, 7 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Application of solvent extraction to slurry systems. Although presence of solids does not hinder extraction of U, losses of extractant by entrainment in the aqueous effluent are increased considerably. Amount of entrainment can be reduced by proper design of mixing equipment, dilution of effluent with water or addition of surface-active agents. 4 ref. (C19a; U)

360-C. Solvent Extraction for Recovering Uranium and Vanadium From Salt-Roast-Process Solutions. J. B. Rosenbaum, S. R. Borrowman and J. B. Clemmer. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/501, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

U and V can be recovered from acid-leach solutions of salt-roast calcines by using a combination extractant composed of an aliphatic amine and an alkyl phosphate in a solution of kerosine containing tributyl phosphate. (C19a; Th, U)

361-C. Solvent Extraction Processing of Uranium and Thorium Ores. K. B. Brown, C. F. Coleman, D. J. Crouse, C. A. Blake and A. D. Ryon. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/509, 1958, 39 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Selected reagents and processes most representative of current U. S. process and development activities. Process flowsheets; pertinent chemistry, reagent costs, equipment, extent of commercial application. 59 ref. (C19a; U, Th)

362-C. Concentration and Purification of Uranium, Plutonium, and Neptunium by Ion Exchange in Nuclearly Safe Equipment. F. W. Tobe. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/520, 1958, 19 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Nuclear safety is obtained by using resin beds with small diameters, or by using a composite column that consists of a series of shallow beds separated sufficiently to avoid interaction of the neutrons from the individually safe beds.
(C19s, A8c; U, Pu, Np)

363-C. A Rationale for the Recovery of Irradiated Uranium and Thorium by Solvent Extraction. T. H. Siddall. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/521, 1958, 24 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Technology and theory of the processing of irradiated nuclear fuels. Details of extractants. (C19a, T11g; U, Th, 14-70)

364-C. Developments in Melt Refining of Reactor Fuels. L. Burris, N. R. Chellew, S. Lawroski, G. A. Bennett, A. A. Chilenskas, M. Ader, H. M. Feder, J. B. Knighton, I. O. Winsch, J. Wolkoff and W. A. Rodger. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/538, 1958, 12 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Process consists simply of melting the fuel in an oxide crucible and holding it molten for a period of several hours. During this time purification from fission products is primarily effected by vaporization of the noble gases and other volatile elements such as cesium; and selective oxidation of the highly electropositive elements such as the rare earths followed by their removal in a surface skin or reaction layer which forms along the crucible walls. 11 ref. (C28; U)

365-C. Production of Boron-10. G. T. Miller, R. J. Kralik, E. A. Belmore and J. S. Drury. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1836, 1958, 30 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Enrichment of the B-10 isotope by the fractionation of the boron trifluoride-dimethyl ether complex; reduction of the enriched complex to elemental B. 15 ref. (C6c; B)

366-C.* (Book.) Zone Melting. William G. Pfann. 236 p. 1958. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Comprehensive coverage of theory and practice includes information on distribution coefficient, theory of zone refining, calculation of distribution, zone refining techniques, application to semiconductors, metals and chemicals. Continuous zone refining methods; zone leveling, zone perturbation techniques and temperature-gradient zone melting. Set of computing zone refining curves showing impurity concentrations throughout ingot as a function of the number of passes. (C28k)

367-C. Zone Melting and Crystal Pulling Experiments with AlSb. W. P. Allred, Bernard Paris and M. Genser. *Electrochemical Society, Journal,* v. 105, Feb. 1958, p. 93-96.

High resistivity ingots result from zone refining in Al_2O_3 crucibles. 4 ref. (C28k, P15; Al, *Sb,* 14-68)

368-C. Flash Melting Copper Concentrates. Petri Boyk, John Ryselin, Jorma Honkasalo and Rolf Malmstrom. *Journal of Metals,* v. 10, June 1958, p. 395-400.

Technique whereby the concentrate, with or without additional fuel, is suspended in gases containing O, so that the heat of oxidation reactions bring the suspended particles to a smelting temperature. From the suspended state the hot particles are separated and molten slag and matte are deposited on the furnace hearth. 12 ref. (C5k; Cu)

369-C. Tough-Pitch Copper Continously Cast. F. Weston Starratt. *Journal of Metals,* v. 10, June 1958, p. 404-406.

New roasting-melting-continuous-casting unit at Asaro, Perth Amboy, N. J. (C5q; Cu)

370-C. Smelting Titaniferous Ores. H. U. Ross. *Journal of Metals,* v. 10, June 1958, p. 407-411.

Application of modern beneficiation and blast furnace techniques. 19 ref. (C21a; Ti, AD-n31)

371-C. Direct Electrorefining of Nickel Matte. L. S. Renzoni, R. C. McQuire and W. V. Barker. *Journal of Metals,* v. 10, June 1958, p. 414-418.

New process, developed by Inco of Canada Ltd., eliminates high-temperature sintering of bessemer matte and reduction of the oxide to metal anodes for electrorefining by casting the molten matte in sulphide anodes and electrolyzed. 10 ref. (C23p; Ni)

372-C. Iron and Nickel by Carbonyl Treatment. R. M. Lewis, J. W. Cookston, L. W. Coffer and F. M. Stephens, Jr. *Journal of Metals,* v. 10, June 1958, p. 419-424.

Techniques for extraction from lateritic nickeliferous deposits. (C1m; Ni, Fe)

373-C. New Techniques for Copper Refining. E. F. Kurzinski. *Journal of Metals,* v. 10, Aug. 1958, p. 533-537.
Uses of industrial gases, particularly oxygen. 7 ref.
(C-general; Cu, O, EG-m44)

374-C. Cadmium Practice at Great Falls. A. I. Alf. *Journal of Metals,* v. 10, Sept. 1958, p. 607-610.
Cd recovery and production in electrolytic Zn plant. (C23; Zn, *Cd*)

375-C. Germanium, Zinc's Important Byproduct. Theophile Boving and Jean Andre. *Journal of Metals,* v. 10, Oct. 1958, p. 659-661.
Removal of Ge during zinc oxide leaching gives residues containing up to 0.3% Ge.
(C19n, A11c; *Ge,* Zn)

376-C. Nickel-Cobalt Separation at Sherritt Gordon. V. N. Mackliw, W. C. Lin, R. L. Benoit and T. W. Benz. *Journal of Metals,* v. 10, Dec. 1958, p. 800-802.
Sherritt Gordon refinery at Ft. Saskatchewan treats Ni-Cu-Co sulphide concentrate in a continuous leaching operation, using ammonia and compressed air. 6 ref.
(C19n; Ni, Co, Cu)

377-C. Formation of Large Grains of Alpha Titanium by Zone Melting. F. J. Darnell. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 356-357.
Melting is in enclosed glass-walled system which is evacuated then filled with argon. Electrical resistivity measurements.
(C28k, P15g; Ti, 14-61)

378-C. Improved Wheaton Najarian Vacuum Condenser. H. K. Najarian. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 493-497.
To dissipate the heat of condensation, the "airlift" action of gases bubbling through molten Zn in condenser is utilized to circulate and cool Zn continuously. (C25; Zn)

379-C. Data on Copper Converter Practice in Various Countries. F. E. Lathe and L. Hodnett. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 603-617.
13 ref. (C21b; Cu)

380-C. Growth of Molybdenum, Tungsten, and Columbium Crystals by Floating Zone Melting in Vacuum. E. Buehler. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 694-698.
15 ref. (C28, 1-73; Cb, Mo, W)

381-C. Zone Melting of Magnesium. A. S. Yue and J. B. Clark. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 881-884.
Effects of zone speed and number of passes of molten zone on purification. Distribution coefficients for impurities calculated. 5 ref. (C28k; Mg)

SECTION D

FERROUS REDUCTION and REFINING

1-D. (Russian.) **Use of Oxygen in a 250-Ton Openhearth Furnace.** S. I. Lifshits and I. F. Sochan. *Stal',* v. 17, May 1957, p. 402-405.

Effectiveness of the furnace can be increased demonstrably by introducing oxygen into the port through the burner during charging, heating and pouring of the molten metal. Oxygen is injected into the bath by a Laval nozzle. (D2g, W18g, 1-52; ST)

2-D. (Russian.) **Influence of Ultrasonics on the Structure and Properties of Steel Ingots.** Ya. B. Gurevich, V. I. Leontiev and I. I. Teumin. *Stal',* v. 17, May 1957, p. 406-411. (Also available as Henry Brutcher Translation No. 4035.)

By experimentally subjecting molten steel to the action of ultrasonic waves during the process of crystallization the macro and the microstructures, as well as the physical properties of the ingot can be considerably improved. 11 ref. (D9, 1-74; ST, 5-59)

3-D. Iscor Works, Vanderbijl Park, South Africa. *Blast Furnace and Steel Plant,* v. 45, Nov. 1957, p. 1270-1292.

(D general; ST)

4-D. By-Passing the Blast Furnace. The U. S. A. Streamlines Direct Reduction to Meet Coking Coal Shortage. Edmund L. Van Devsen. *Engineer and Foundryman,* v. 22, Aug. 1957, p. 36-39.

(D8j; Fe)

5-D. Blast-Furnace Practice Using Sinter Burdens. Results at Appleby-Frodingham Steel Co. H. S. Ayres. *Iron and Coal Trades Review,* v. 175, Sept. 13, 1957, p. 601-604.

Practice and results. (D1a, Fe)

6-D. The 48th BISRA Steelmaking Conference. Pt. I. Increasing Open-Hearth Productivity by Modernization of Older Plants. *Iron and Coal Trades Review,* v. 175, Sept. 13, 1957, p. 621-624.

Report of first session of conference held May 8-9, 1957. (D2, 1-52)

7-D. Submerged Arc Pig-Iron Production. W. Bleloch. *Mining and Industrial Review,* v. 101, Aug. 1957, p. 20-22.

An alternative to the blast furnace. (D8n, CI-a)

8-D. (German.) **Melting of Transformer Steel.** Kurt Fellcht and Helmut Kutscher. *Neue Hütte,* v. 2, Sept. 1957, p. 525-537.

Influence of C, Si, Mn, P, S, Cu, Al, Cr, W, Ni, V, Mo, Ti, H, N, O; physical and technical properties; eddy current loss values; utilization of a 75 and a 90% ferrosilicon during melting. 17 ref. (D general, 2-60; SGA-r, AY)

9-D. (Polish.) **Problems of Transformer Steel Refining.** M. Stankiewicz. *Hutnik,* v. 24, July-Aug. 1957, p. 266-271.

Chemical composition and influence of the elements upon magnetic properties of the steel. Problem of nonmetallic inclusions of ferrosilicon type. Refining in electric and openhearth furnaces. (D2, D5, P16, 2-60; SGA-r, AY)

10-D. (Polish.) **Technology of Transformer Steel Refining in U.S.S.R.** G. M. Borodulin. *Hutnik,* v. 24, July-Aug. 1957, p. 272-277.

Chemical composition; preparation of the furnace; charging raw materials; oxidation period; reduction period; finishing of the melt; vacuum treatment of the metal. (D2; SGA-r, AY)

11-D. (Russian.) **Operation of Blast Furnace With Increased Gas Pressure.** I. A. Kuzmin. *Metallurg,* v. 2, July 1957, p. 3-5.

Savings in coke consumption; overall output increase with substantial increase of slag output. (D1h; Fe)

12-D. (Russian.) **Efficiency of Oxygen Application in Steel Smelting.** V. A. Rozhkov. *Metallurg,* v. 2, July 1957, p. 12-15.

Openhearth furnace operation using oxygen. Steel output was increased by 8-10%. (D2g; ST)

13-D. (Russian.) **New Technology of Stainless Steel Melting.** B. A. Shilyaev. *Metallurg,* v. 2, July 1957, p. 20-21.

New process giving Cr losses below 12%; lining life increased by 50-100%. (D general; SS)

14-D. Vacuum Treatment of Molten Metal. *Foundry Trade Journal,* v. 103, Oct. 31, 1957, p. 527-529.

Russian experiments on bessemer and electric steels.
(D8m, ST-f, ST-g)

15-D.* **Vacuum Melting in the Steel Industry Today.** W. W. Dyrkacz. *Journal of Metals,* v. 9, Dec. 1957, p. 1513-1516.

Advantages and disadvantages of induction vacuum melting and consumable-electrode vacuum arc melting. Typical applications of each process. 32 ref. (D8m; ST)

16-D.* **Ladle Slag-Refining of Electric Furnace Steel.** Rene Perrin and F. Weston Starratt. *Journal of Metals,* v. 9, Dec. 1957, p. 1517-1520.

Rapid desulphurization and deoxidation practice at the Ugine plant. Metal is tapped from the furnace into a ladle containing slag especially made to accomplish these processes. Other slags have been developed to reduce the P and Si contents of killed and rimming steels and to desiliconize and desulphurize iron. (D11n, D11r, D5; ST)

17-D.* **An Oxygen Steelmaking Process.** F. W. Luerssen, J. W. Halley and M. Tenenbaum. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Dec. 1957, p. 1533-1540.

High-carbon low-phosphorus steel can now be made from pig iron containing 0.7% P or more, in a commercial sized openhearth furnace. No external heat is required for refining and steel produced is identical with basic openhearth steel. 14 ref. (D10; ST)

18-D.* **Origin and Elimination of Hydrogen in Basic Open-Hearth Steels.** W. L. Kerlie and J. H. Richards. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Dec. 1957, p. 1541-1548.

The variation in hydrogen content of basic openhearth steels during refining and the effect of changing from steam to air atomization. The water content of the furnace atmosphere, the slag basicity, and the degree of oxidation of the slag-metal system largely control the hydrogen in the steel. 7 ref. (D11; ST-e, *H*)

19-D. Vacuum Melted Steel. Commercial Scale Production in Sheffield. *Metallurgia,* v. 36, Nov. 1957, p. 237-238.

At G. L. Willan Ltd. (D8m; ST)

20-D. (Czech.) **Economy of Remelting Czechoslovak Renn-Process Granules in Blast, Low-Shaft, Reverberatory and Cupola Furnaces.** Alexander Dékanovsky. *Hutnické Listy,* v. 12, 1957, p. 673-682.

Surveys and compares methods. Resulting intermediate product is bessemer pig iron or reverberatory iron and cupola furnace iron. Treatment of balls in blast furnaces proved most effective. 33 ref.
(D general, W17, W18; Fe)

21-D. (Czech.) **Importance of Vacuum Steel Casting for Metallurgical Practice.** Zdenek Eminger, Frantisek Kinsky and Zdenek Kletecka. *Hutnické Listy,* v. 12, 1957, p. 755-767.

Only method employed at present consists of vacuum casting followed by cooling under normal atmospheric pressure. Vacuum casting shortens production time and gives closer control of mechanical properties. (D9, 1-73; ST)

22-D.* (German.) **Rimming Steel.** Leo Heinen and Alfred Latour. *Stahl und Eisen,* v. 77, Sept. 1957, p. 1204-1209.

Variables affecting yield of rimming type free-cutting steel include melting practice and indirect effect of oxygen in the heat, direct effect of oxygen, C, Mn, S content, Mn:S ratio, pouring conditions and S segregation. (D9p, 2-60; ST-d, *Mn, S*)

23-D.* (German.) **Production of High-Quality Killed Steel.** Herman Schenck. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1442-1450.

Extent of slag forming reactions, influence of slag change; appearance and removal of oxygen dissolved in the molten steel, useful effect of higher oxygen content; ultimate ef-

fect on the slag; activity of ferrous oxide in the mixing of slags. 16 ref. (D2, D11n, ST-d)

24-D. (German.) **Control of Bessemer Converters by Spectral Analysis of the Smoke.** Franz Wever, Walter Koch, Hans Lüdering, Helmut Knüppel, Karl Ernst Mayer, Bernd Alexander Steinkopf and Gert Wiethoff. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1451-1459.

Sampling at the converter; interpretation of the spectrometer curve on the basis of optical characteristics of the converter flame and of the converter smoke; analysis of the smoke and relationship of its formation with metallurgical reactions. 17 ref. (D3, S11k)

25-D. (Russian.) **New Types of Solid Solution in High-Titanium Slags.** A. V. Rudneva, M. S. Model' and T. Ya. Malysheva. *Akademiya Nauk S.S.S.R. Doklady,* v. 115, July 1, 1957, p. 141-144. (CMA)

Minerals of the rutile type, $MgO\text{-}TiO_2$, $FeO\text{-}TiO_2$ and $MnO\text{-}TiO_2$, forming among them and with Ti_2O_3 continuous series of solid solutions miscible in all proportions. 7 ref. (D11n; Ti, Mg, Mn, RM-q)

26-D. (Russian.) **Melting of Killed Carbon Steel Previously Unreduced in the Open Hearth Furnace.** A. I. Borodulin. *Metallurg,* v. 2, July 1957, p. 16-17.

Experimental melting of rail steel without previous reduction in the openhearth furnace. Savings in ferromanganese consumption were 30-100%. (D8; CN; *Mn*)

27-D.* **How a Light Vacuum Can Purify Steel.** *Canadian Machinery,* v. 68, Sept. 1957, p. 164-166.

Gas-free steel made in experimental quantities by a steam-degassing process. (D8m, D9s; ST)

28-D. **Vacuum Melting of Steels Improves Engineering Properties.** H. C. Regean, Jr. *SAE Journal,* v. 65, Sept. 1957, p. 67-71.

(D8m; ST, SS, AY)

29-D. **Manufacture of Steel by the Oxygen Lance.** W. S. Williams. *British Steelmaker,* v. 23, Dec. 1957, p. 378-379.

(D10; ST)

30-D. **Liquid Fuel Additives. Uses in Steelmaking.** J. Firminger. *Iron and Steel,* v. 30, Dec. 1957, p. 642-644.

Chemical and physical properties of liquid fuels; a benefit derived from the use of additives. Applications of liquid fuel include openhearth furnaces, soaking pits, reheating furnaces and mill furnaces. (D general, F21b; RM-k)

31-D.* **Economic Future of the Large Electric Arc Furnace.** W. B. Wallis. *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 110-113.

Future of the electric furnace will become unlimited as soon as it is divorced from 100% scrap charge; possible alternates are use of hot metal, use of hydrogen-reduced ores and desiliconized hot metal; production of electric furnace pig iron at lower than present power rates provides another alternative. (D5, 17-53; ST)

32-D. **New Trends in Firing Practices for Open Hearths.** James E. Goodin. *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 158-159.

Experimental program at Granite City Steel Co. using high-pressure natural gas to replace steam as the atomizing agent in the furnaces. (D2; ST, RM-m)

33-D. **Expansion Program at Great Lakes Steel Corp. Nears Completion.** *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 180-183, 186.

(D general, W10; ST)

34-D.* **Study of the Tuyere Combustion Zone.** J. Taylor, G. Lonie and R. Hay. *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 330-341.

The tuyere combustion zone has been explored on an experimental furnace by raceway measurements and gas-composition surveys. Effects of variables such as air velocity and temperature, tuyere diameter, and coke size. Concluded that raceway measurements, which are easy to make, are a reliable guide to the extent of the combustion zone. 8 ref. (D1b; Fe)

35-D. (German.) **Trials With Graded Steel Plant Limestone in the Basic Bessemer Converter.** Karl Ernst Mayer, Hans Jürgen Darmann, Gerhard Trömel and Karl Heinz Obst. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1614-1618.

4 ref. (D3, 1-65; RM-q; ST)

36-D. (German.) **Temperature Losses of Steel After Tapping.** Herbert Neuhaüs, Hans-Joachim Kirschning and Werner Münstermann. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1660-1666.

21 ref. (D9n, S16; ST)

37-D. (German.) **Performance of an Openhearth Steel Plant and Blooming Mill. Industrial Engineering Aspects.** Helmut Kallenbach. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1667-1673.

3 ref. (D2, F23n, A5; ST)

38-D. (Russian.) **Increasing Blast Furnace Efficiency.** M. Ya. Ostroukhov. *Metallurg,* v. 2, Aug. 1957, p. 7-10.

Coke consumption, size of sinter and blast pressure. (D1)

39-D. (Russian.) **Thermal Relationships of Openhearth Process When Blowing Oxygen Through the Bath.** V. T. Sladkoshteev and G. A. Podolskaya. *Metallurg,* v. 2, Aug. 1957, p. 21-22.

Details of the operation of a 350-ton openhearth furnace. (D2g)

40-D.* (Russian.) **Burning of Blast Furnace Bottoms and Selection of Air Cooling Design.** S. M. Andonev, O. V. Filipev and G. A. Kudinov. *Stal',* v. 17, Aug. 1957, p. 685-690.

Rate of furnace bottom burning established principle of electromodeling. The rate of burning reduced by air cooling. Two alternative designs of the furnace bottom air cooling system. (D1, W17g)

41-D.* (Russian.) **Bessemer Steel Production by Blowing Oxygen From the Top.** S. G. Afanasev, M. M. Shumov, Z. D. Epshtein, T. V. Andreev, N. I. Beda, I. I. Korobov, O. N. Kostenetskii, S. I. Livshits, P. S. Rubinskii and S. N. Filipov. *Stal',* v. 17, Aug. 1957, p. 693-700.

Converter steel process using technically pure oxygen. Properties of the steel are similar to the properties of openhearth steel. Efficiency of the process is 87-88%. (D3f; ST)

42-D.* (Russian.) **Perfection of Reduction Technology of Rimming Steel.** A. A. Bezdenezhnikh, A. M. Bigeev, E. I. Dikshtein, P. N. Perchatkin and A. I. Sirotenko. *Stal',* v. 17, Aug. 1957, p. 701-707.

New method of computing quantity of ferromanganese to be added to rimming steel at the moment of tapping. The process minimizes steel losses due to boiling in the molds and insures that manganese content is according to specification. 5 ref. (D9r; ST-d, Mn, AD-n)

43-D.* (Russian.) **Transfer of Sulphur Between Gaseous Phase and Basic Openhearth Bath.** S. N. Stupar. *Stal',* v. 17, Aug. 1957, p. 707-713.

Investigation of the mechanism of sulphur transfer between gaseous phase and openhearth basic bath and vice versa allows improvement of steel desulphurization process. 12 ref. (D11h, D2; ST)

44-D. Induction Vacuum Melting . . . Factors for Metallurgical Control. W. E. Jones. *Industrial Heating,* v. 26, Nov. 1957, p. 2256-2264, 2413-2414.

8 ref. (D8m, 1-69; SGA-h, SS)

45-D. Research in the Direct Reduction of Iron Ore. H. S. Turner. *Mining Congress Journal,* v. 43, Dec. 1957, p. 59-63.

Anticipated developments in direct reduction processes should facilitate early commercial applications. (D8j; Fe)

46-D. Vacuum Stream Degassing Takes Hold. K. C. Taylor. *Steel,* v. 141, Dec. 23, 1957, p. 70-72.

Advantages of vacuum stream degassing of steel. (D9s, 1-73; ST)

47-D. Effect of Reducibility of Self-Fluxing Sinter on Working of the Blast Furnace. A. M. Bannykh and A. G. Neyasov. *Stal',* v. 15, no. 11, 1955, p. 963-968. (Henry Brutcher Translation no. 4014, Altadena, Calif.)

Previously abstracted from original. See item 53-D, 1956. (D1, Fe)

48-D. Effect of Heating of the Blast Upon the Working of a Blast Furnace. I. G. Boichenko. *Stal',* v. 17, no. 6, 1957, p. 483-486. (Henry Brutcher, Translation no. 4051, Altadena, Calif.)

(D1b)

49-D. Vacuum Metallurgy (of Steel). Deoxidation and Desulphurization in Vacuum. G. A. Garnyk and A. M. Samarin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* May 1957, p. 77-84. (Henry Brutcher Translation no. 4054, Altadena, Calif.)

(D8m, D5c)

50-D. On the Reduction of Hematite by Solid Carbon. K. Shimanaka. *Tetsu to Hagane,* v. 43, no. 9, 1957, p. 1017. (Henry Brutcher Translation no. 4064, Altadena, Calif.)

(D8; Fe)

51-D.* Lime Powder Desulphurization Proves Practical, Efficient. *Iron Age,* v. 180, Oct. 31, 1957, p. 66-67.

Process consists of blowing a suspension of powdered lime either in air or nitrogen through bottom of special ladle and into liquid pig iron. For 12 tons of pig iron, duration of blow was 5 min. with lime concentration of nitrogen of about 0.5 lb. per cu. ft. and flow of about 120 cu. ft. per min. Method reduces

sulphur content to below 0.010%. (D9s, D11h; CI-a)

52-D. New U. S. Developments in Direct Reduction. A. Hegarty. *Iron and Steel,* v. 30, Oct. 1957, p. 483-485.

Current efforts in the U. S. in the direct reduction of iron ore including H-iron process, Esso-Little reduction process and U. S. Steel fluidized bed reduction system. (D8j)

53-D.* Influence of Slag on Iron Composition. A. J. Burgess and B. G. Baldwin. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 510-514.

Three-week trial carried out at blast furnace to investigate relation between metal composition and slag properties. Data collected on composition and temperatures of slag and metal at every cast during trial period. Normal practice was followed during first week; in second week slag basicity altered by reducing limestone charge; in third week basicity and sulphur level in iron were returned to normal. Discusses sulphur balance of in-going and outgoing materials, liquidous properties of blast furnace slags, differences in manganese and sulphur contents of roughing and flushing slags and carbon and silicon content in relation to furnace operation and slag contents. (D11n, D1; CI-a, RM-q)

54-D.* Proposal for a Self-Lining Blast Furnace. W. A. Archibald, T. P. Brown and L. A. Leonard. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 515-521.

Nature of the burden and the refractory, movement of materials in blast furnace, forces acting on refractory walls, phase changes and causes of lining failure. Proposals for self-lining blast furnace using refractory nature of burden held in static layer along furnace walls by series of water-cooled shells. Stacked tuyeres suggested for controlling hanging and scaffolds. (D1b, 1-52; RM-h, CI-a)

55-D. Blast-Furnace Slags. B. G. Baldwin. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 522-526.

Apparatus and experimental procedure used in study of liquidus temperatures, rate of melting, crystal growth, crystal movement and viscosity of 20 blast furnace slags representative of those of the United Kingdom. Chemical analysis of SiO_2, CaO, MgO, AlO and MnO and S content. Compares calculated and measured liquidus temperature; discusses primary phase composition, liquidus temperature, basicity and viscosity. (D11n, D1)

56-D. Commercial Vacuum Melting. *Iron and Steel,* v. 30, Nov. 1957, p. 591-594.

Small British vacuum melting installation, its operation and results obtained. (D8m, 1-55)

57-D. (Russian.) **Correction Method in Blast Furnace Operation.** A. N. Redko. *Metallurg,* v. 2, Sept. 1957, p. 3-5.

Relationship between change of optimum ore charge, temperature and humidity of blast, CO_2 content in the gas, specific slag output and coke consumption. Suggestions for immediate correction of the process to maintain silicon and sulphur contents constant. (D1b; Fe, *S, Si*)

58-D. (Russian.) **Control of Blast Furnace Operation by Static Pressures Differences.** P. G. Baranovskii and A. A. Kargin. *Metallurg,* v. 2, Sept. 1957, p. 5-7.
(D1b, Fe)

59-D. (Russian.) **Influence of Lithium Addition Upon Certain Properties of Austenitic Steel.** R. P. Zaletaeva. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 25-27.

Introduction of up to 0.03% Li into austenitic steel considerably reduces contents of the gases in the steel. (D9s; ST, *Li,* AD-q)

60-D.* (Russian.) **Production of Pig Iron Using Oxygen Enriched Blast.** I. P. Bardin, S. K. Trekalo, A. F. Zakharov, F. A. Khilkevich and B. L. Lazarev. *Stal',* v. 17, Aug. 1957, p. 673-684.

Experimental smelting using prepared burden and oxygen-enriched blast. The efficiency of the process was improved. It was essential to use oxygen produced in large plants to lower cost of the process. (D1h; CI-a)

61-D. (Russian.) **Blast Furnace Run at 1.1 Atm. Pressure.** V. P. Onoprienko, B. N. Starshinov, A. A. Tkachenko, V. D. Sinitskii, L. M. Friedin and L. Ya. Portnyi. *Stal',* v. 17, Sept. 1957, p. 772-778.

Significant improvement of performance of the process was obtained. (D1h)

62-D. (Russian.) **Temperature Schedule of Openhearth Smelting of Phosphorus Pig Iron Using Oxygen.** I. A. Zaitsev. *Stal',* v. 17, Sept. 1957, p. 788-792.

6 ref. (D2g; ST)

63-D.* The Basic Roof-Extended Hearth-Use of Oxygen Firing Rates at Granite City Steel Co. Arthur L. How-

ard. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 49-51.

The main disadvantage of the basic roof, in that it loses strength with high temperatures, is overweighed by the fact it can stand higher temperatures, in excess of 3500° F. compared with 3000 to 3100° F. for the silica brick roof. Higher temperatures, of course, mean shortened melt-down time, and thus less heat time. (D2, W18r; ST, RM-h)

64-D.* Heat Flow in Ingot Hot-Top. G. Fenton. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 70-72.

Measurement of heat losses from the hot-tops of 9-in. square ingots have enabled the relative importance of the different heat losses, and their variation over the solidification period, to be assessed. The heat content of the refractory is shown to account for by far the greatest proportion of the total heat loss, so that the vtial property of any hot top tile is its thermal capacity rather than its conductivity. (D9m; ST, 5-59)

65-D.* Techniques and Problems in Vacuum Melting. Edward A. Loria. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 73-78.

Vacuum melting, the variation of pressure and melt atmosphere during melting, refining and casting, exerts its major effect on the control of gas content and of minor elements (normally nongaseous). Involved in the former are melting atmosphere reactions, deoxidation practice and the control of gas evolution during solidification; while the latter is concerned with the removal of nongas trace elements by distillation and the control of refractory reactions. (D8m; ST)

66-D.* Recarburization of Molten Iron in a High Speed Rotary Vessel. R. I. Higgins and J. C. Billington. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 95–104.

Small-scale experiments which encourage the belief that this process could be conveniently achieved at low cost by dissolving coke breeze in the molten iron in a high-speed rotary vessel. An appreciable drop in temperature is associated with the recarburization of molten Fe by means of cold carbon additions, and although the experimental technique employed did not permit this to be measured, caculations have been made to indicate the magnitude of the effect. 11 ref. (D8n; ST)

67-D. Direct Reduction of Iron Ore in the United States. Harry W. McQuaid. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 69-77.

High investment cost of the blast furnace-openhearth combination has put it on the defensive, and the electric arc furnace is one way of meeting increased steel demand at a minimum capital cost. Since scrap supplies and prices are erratic, attention has been paid to the development of the direct reduction process. (D8j, A4s; ST)

68-D. The Steel Industry of Mexico —Its Present and Immediate Future. *Iron and Steel Engineer, Journal,* v. 35, Jan. 1958, p. 80-87.

(D general, A4; ST)

69-D. Developments in Metallic Recuperators. Thomas E. Dixon and Heinz A. Kuhne. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 127-138.

Details of several designs of European recuperators with some American examples. (D1b, 1-55; ST)

70-D.* Oxygen Rejuvenates the Converter Process. E. C. Wright. *Metal Progress,* v. 73, Jan. 1958, p. 65-71.

The Linz-Donawitz (L-D) process of blowing impurities out of pig iron with a stream of pure oxygen striking the top of the bath is now operating in Hamilton, Ont., and Detroit. The prediction is made that its use will expand rapidly in America where new steel capacity is needed. (D10a; ST)

71-D.* Continuous Casting of Gray Iron. Adalbert Wittmoser. *Metal Progress,* v. 73, Jan. 1958, p. 83-87.

Rounds, and especially tubes, of gray iron are now cast in a collar mold and slowly withdrawn downward in tempo with the pouring rate. Gas and water pipe in sizes up to 3 ft. diameter and 33 ft. long, as well as large cylinder liners, are being made in quantity in a West German foundry. (D9q; CI-n)

72-D. (French.) Control and Regulation of Openhearth Furnaces. A Study of the Factors Having an Influence on Their Operation. R. Alleyrac, L. Septier, M. Faure, R. Ferry and Hoang Chan. *Institut de Recherches de la Siderurgie, Publications,* Series A, no. 167, Aug. 1957, 127 p.

A study of operation of openhearth furnaces in two plants having 70 furnaces. The productivity of the furnaces was improved 5 to 10% without any increase of the fuel consumption. The life of the roofs of

the furnaces was increased.
(D2, W18r; RM-h, ST)

73-D. **New Deoxidizing and Desulphurizing Practice for Improved Steel Quality.** V. A. Skachko and N. P. Merenkov. *Stal',* v. 17, no. 6, 1957, p. 521-522. (Henry Brutcher Translation no. 4080, Altadena, Calif.)

Previously abstracted from original. See item 300-D, 1957.
(D9r; ST, *Al*)

74-D. (German.) **Adjustment of Openhearth Furnaces.** Wilhelm Liesegang. *Siemens Zeitschrift,* v. 31, Oct-Nov. 1957, p. 447-481.
8 ref. (D2, W18r)

75-D.* (German.) **Metallurgy of Ferromanganese.** Gerhard Heynert, Jacob Willems, Willy Oelsen and Eberhard Schürmann. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1717-1728.

Phenomena occurring during the production of ferromanganese in the blast furnace; relations between Mn, Si and C; conditions necessary for production of alloys rich and poor in Si; adequate slag ranges. 27 ref.
(D1; Fe, Mn, AD-n, RM-q)

76-D. (German.) **Design, Equipment and Operational Results of a Double-Chimney Openhearth Furnace.** Ernest Goebel and Heino Leopold. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1733-1739.
(D2, W18r)

77-D. (German.) **Survey of Steel and Steel Alloy Manufacturing Methods.** Franz Sommer. *VDI Zeitschrift,* v. 99, Oct. 21, 1957, p. 1517-1525.

A general discussion on steelmaking; data on properties and applicability of many steel alloys. 10 ref. (D general, Q general, 17-57; ST)

78-D. (Russian.) **Soviet Blast Furnace Production.** I. A. Nekrasov. *Stal',* v. 17, Nov. 1957, p. 965-968.
(D1, A4p; ST)

79-D. (Russian.) **Experience in the Operation of a 500-Ton Openhearth Furnace.** G. A. Garbuz, M. P. Sabiev and E. A. Ploshchenko. *Stal',* v. 17, Nov. 1957, p. 976-982.

Largest openhearth furnace in Europe. Construction, installation and operation, shortcomings.
(D2, W18r)

80-D. (Russian.) **High-Grade Steel Industry in U. S. S. R.** A. S. Nikolaev. *Stal',* v. 17, Nov. 1957, p. 976-991.
(D general, A4; ST)

81-D. (Russian.) **Progress in Converter Production.** S. G. Afansev. *Stal',* v. 17, Nov. 1957, p. 982-987.
21 ref. (D3)

82-D. (Russian.) **Automation of Thermal and Production Processes in the Iron and Steel Industry.** V. V. Vorobei and A. M. Zimakov. *Stal',* v. 17, Nov. 1957, p. 1024-1027.

Application of automation to blast furnace and electric furnaces and to rolling mills. Several research institutes dedicate their entire effort to furthering automation in this industry. (D general, F23, 18-74; ST)

83-D.* (Czech.) **Thermodynamic Investigation of Reactions of Iron Desulphurization and Dephosphorization.** L. A. Svarcman. *Hutnické Listy,* v. 12, Nov. 1957, p. 965-970.

Radioactive isotopes are used to determine sulphur and phophorus distribution in liquid iron and slag. Accuracy does not depend on absolute concentration of element distributed. Higher concentration in metallic than in slag phase and vice versa may be determined by two appropriate methods given. Equipment enables determination of distribution coefficients for constant chemical composition of the slag and variable temperature. 11 ref.
(D10n, P12, 1-59; Fe, *S, P*)

84-D. (Czech.) **Vacuum Desulphurization of Pig Iron.** A. M. Samarin and Ivan Kasik. *Hutnické Listy,* v. 12, Nov. 1957, p. 970-974.
11 ref.
(D10n, D1, 1-73; Fe, *S,* AD-a)

85-D.* (Czech.) **Effect of Manganese-Silicon and Aluminum as Deoxidizing Alloys and on Quantity and Arrangement of Nonmetallic Inclusions in Steel.** Theodor Myslivec. *Hutnické Listy,* v. 12, Nov. 1957, p. 989-1000.

Complex ferromanganese-silicon-aluminum and ferromanganese-silicon alloys were added in the solid and liquid state. The former is superior as to quantity and composition of the inclusions as well as in wider application despite a lower Mn:Si ratio. Aluminum oxide formed in steel during the process, from small Al additions, prevents formation of high-melting silicates. Application of liquid deoxidizing alalloys is advantageous. 10 ref.
(D9r; D10r; ST, 9-69, AD-r)

86-D. (Czech.) **Effect of Sulphur Concentration on Kinetic Parameters of Iron Desulphurization.** Jiri Skala and Oleg V. Travin. *Hutnické Listy,* v. 12, Nov. 1957, p. 1000-1008.
31 ref. (D10n, D1; Fe, *S,* AD-a)

87-D. (Czech.) **Converter Technology Using Oxygen in the U.S.S.R.** F. Krumnikl and J. Bartos. *Hutnické Listy,* v. 12, Nov. 1957, p. 1026-1033.
(D3f; ST)

88-D. (Czech.) **Methods of Continuous Steel Casting in the U.S.S.R.** Frantisek Jansch. *Hutnické Listy,* v. 12, Nov. 1957, p. 1033-1039.
(D9q; ST)

89-D. (Czech.) **Homogeneity of Very Heavy Ingots and Its Effect on Mechanical Properties.** Oldrich Bohus. *Hutnické Listy,* v. 12, Nov. 1957, p. 1039-1045.

Specifications for production, pouring and solidification of ingot sections of basic steel weighing 80 tons. 10 ref. (D9, 5-59; ST)

90-D. (German.) **Dephosphorization of Iron by High-Lime Slags.** Gerhard Tromel and Hans Werner Fritze. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 489-495.

Experiments showed that the phosphorus and oxygen content of iron under lime-saturated slags rises with increasing temperatures. In the temperature range of 1600° C., saturation areas for the systems $CaO-P_2O_5-FeO$ and $CaO-P_2O_5-FeO-SiO_2$ are represented in special multidimensional saturation diagrams, developed for complex multi-component systems. 6 ref.
(D2d, D11n; Fe, RM-q)

91-D.* (German.) **Behavior of Hydrogen in Oxygen-Steam Converter Process.** Herbert Neuhaus. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1863-1867.

Solubility of hydrogen, analytical methods of determination, hydrogen content in the converter steel when using different blast mixtures, hydrogen movement. 16 ref.
(D3, S11r; ST, *H*)

92-D.* (German.) **Desulpuhrization in the Basic Openhearth Furnace.** Karl-Georg Speith, Hans von Ende and Gustav Mahn. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 27-34.

Effect of Mn and temperature on sulphur content of first sample. Desulphurization during boiling period in melting with and without Mn reduction. Sulphur content during tapping. Effect of slag composition in desulphurization under oxidizing slags. Chemical combination of sulphur in the slag. 17 ref.
(D2d, D10n; ST, *S*)

93-D. (Polish.) **Computation of the Quantity of Combustion Gases and Air in Openhearth Process.** J. Szargut and J. Machniewicz. *Hutnik,* v. 24, Oct. 1957, p. 391-397.

Balance of carbon, hydrogen, oxygen and nitrogen in openhearth process. Computation of stack losses. Calculation examples. (D2h)

94-D. (Russian.) **Prevention of Dust Formation on Blowing Oxygen Through the Molten Bath.** G. S. Selkin and N. I. Zadalya. *Stal',* v. 17, Oct. 1957, p. 884-887. (Henry Brutcher, Altadena, Calif., Translation no. 4056.)

Minimizing wear and dust generation of openhearth furnaces with oxygen blast by substituting oxygen-water vapor mixture for pure gas. (D2g, A8a)

95-D. (Russian.) **Contamination of Ball-Bearing Steel With Refining Slag.** V. F. Smolyakov, E. S. Kalinnikov and V. D. Potapov. *Stal',* v. 17, Oct. 1957, p. 893-898.

Method of impurity determination. Contamination in electric furnace was higher with free flowing slags and lower with basic, heavy-consistency slags.
(D5d, D11n, 9-69; ST, SGA-c)

96-D. (Russian.) **Melting of Chromium-Nickel Steel Using Pelletized Nickel Oxide.** I. P. Zabaluev, T. M. Bobkov and N. T. Tareshchuk. *Stal',* v. 17, Oct. 1957, p. 899-901.

Details and advantages of high-alloy steel melting in electric arc furnaces introducing Ni in a form of pelletized NiO.
(D9r, D5c; AY, *Ni,* AD-n)

97-D.* **Heat Flow in Ingot Hot-Top.** G. Fenton. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1415-1422.

Investigation by thermocouples and radiation pyrometers on nature and rate of heat flow and heat loss in ingot hot tops made of fire brick, insulating brick and with vermiculite insulation; 500-lb. ingots of silicon-killed carbon steel were cast and the rate of heat transfer and its effect on piping for the different hot top steels determined. Heat retained by hot top refractory accounted for more than 50 to 75% of the heat loss from the feeder head of the ingot. (To be continued.) (D11k, D9, P11k; ST, 5-59)

98-D. **Broken Hill Proprietary Co., Ltd. Maker of Steel for Australia.** Colin Y. Syme and Norman E. Jones. *Blast Furnace and Steel Plant,* v. 46, Feb. 1958, p. 170-197.

Plant layout, equipment, capacity, resources, raw materials and organization of the company.
(D general, 18-17, 1-52; ST)

99-D. Steel Made by Basic Oxygen Process at Aliquippa. *Blast Furnace and Steel Plant,* v. 46, Feb. 1958, p. 205-208.

(D10)

100-D.* Electric Arc Furnace Practice. D. P. Patell. *Institution of Engineers, Journal (India),* v. 38, Sept. 1957, p. 84-114.

Principles, description, operation of arc furnaces. 6 ref.
(D5, W18s; ST)

101-D.* Getting More Iron From Blast Furnaces. *Steel,* v. 141, Dec. 9, 1957, p. 164-176.

Effect on furnace operation and output of beneficiation of iron ore, sintering, improved coke quality, sizing of limestone, use of moisture and oxygen in blast, higher blast temperatures and higher top pressures. (D1; Fe)

102-D.* Hydrogen in Electric Steelmaking. T. W. Merrit. *Vancoram Review,* v. 12, Fall 1957, p. 14-15, 25.

In experiments to establish quantitatively effect of some of variables which determine final hydrogen content of steel, moisture content of air in furnace was found to be most important factor in determining H absorption into molten steel; rate of H absorption and total time steel was in furnace following oxidation period appear to have determined final H content of steel at top.
(D5, N15e; ST, *H*)

103-D. (Hungarian.) **Data on Openhearth Furnaces Fired With Cold Coke Oven Gas.** Gellért Répasi. *Kohaszati Lapok,* v. 12, Aug-Sept. 1957, p. 403-410.

(D2h; RM-m38)

104-D.* Possibilities of Desulphurizing Blast Furnace Hot Metal. Pt. 1. Additions of Aluminum Near Iron Notch During Casting. A. Banerjee, V. G. Paranjpe and S. Visvanathan. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 21-31.

Effects of Al additions are very marked with 0.8% Si hot metal but of low order in high-Si metal (1.48% Si). Almost negligible with metal containing 1.5% Si and 0.27% Ti, even if slag contains only 12% alumina. 8 ref.
(D11n, D1b; RM-q, Fe, *Al*)

105-D.* Possibility of Desulphurizing Blast Furnace Hot Metal. Pt. 2. By Injecting Fluidized Agents. P. K. Chakravarty, V. G. Paranjpe and S. Visvanathan. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 33-50.

Fluidized injection of calcium cyanamide, calcium silicide, high-grade lime, 1.5% of metal weight, and fluidized powder of white slag, containing above 1% carbide, effects over 60% desulphurization. Lime is upgraded with calcium silicide, fluorspar or Al. Basicity of slag affects rate of sulphur pickup. 19 ref. (D11n, D1b; RM-q)

106-D.* Distribution of Titanium Between Blast Furnace Metal and Slag. P. Mehta and V. G. Paranjpe. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 51-60.

Titanium content of local pig iron varies from 0.12 to 0.21%; increasing temperature increases extent of reduction. Reduction is correlated with Si using reaction index K_{Si-Ti}, which increases with basicity and is decreased by increasing titania content in slag. Manganese recovery is correlated with Ti content of metal. 11 ref.
(D11n, D1d; RM-q, Fe, *Ti*)

107-D.* Direct Reduction of Iron Ore to Yield Usable Steel. Pt. 2. Jatinder Mohan, P. K. Gupte and B. R. Nijhawan. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 73-81.

Sulaipat ore is electromagnetically concentrated to reduce gangue material and extruded in bars with different binding agents. The reduced product is forged and rolled and studied for density. The treated ore gives a crack-free product, easily forged and rolled and comparable to steel manufactured in the usual way. 4 ref. (D8j; B14n, ST)

108-D.* (German.) **Importance of Vacuum Casting of Steel in Metallurgical Practice.** Zd. Eminger, F. Kinsky and Z. Kletecka. *Neue Hütte,* v. 2, Oct. 1957, p. 590-600. (Henry Brutcher, Altadena, Calif., Translation no. 4139.)

Reduction of hydrogen content by casting in vacuo; influence of different casting conditions on properties of structural steels. 7 ref.
(D8m; ST)

109-D. (German.) **Origin and Elimination of Inclusions in Molten Metals.** E. Schwarz-Bergkaupf. *Radex Rundschau,* no. 5-6, 1957, p. 708-710.

Theoretical consideration of the deoxidation process in liquid iron. 6 ref. (D11r, 9-69)

110-D. (Hungarian.) **Purpose of Low-Shaft Blast Furnace.** Laszlo Visnyovszky. *Kohaszati Lapok,* v. 12, June 1957, p. 221-227.

Advantage of blowing with air enriched by oxygen. (D8n, D1h, W17h)

111-D. (Hungarian.) **Development of Continuous Casting.** Frigyes Arkos. *Kohaszati Lapok,* v. 12, June 1957, p. 234-239.

9 ref. (D9q)

112-D. (Russian.) **Eliminating Pulsation of Flame During Burning of Furnace Gases in Blast Heater.** V. G. Serdyukov. *Metallurg,* Dec. 1957, p. 11-13.

(D1b, W17g; RM-m39)

113-D. (Russian.) **Removing Slag With Extension-Type Plates.** G. M. Kroitman. *Metallurg,* Dec. 1957, p. 22-23.

Method of removing slag at Liebknekht plant during hot or cold remantling by specially constructed removable plates in slag chamber which result in considerable time saving. (D2d, W18r)

114-D. (Russian.) **Use of Extendable Chambers for Removal of Slags.** V. B. Kaplun and E. D. Akoltsev. *Metallurg,* Dec. 1957, p. 23-24.

(D2d, W18r)

115-D. Continuous Castings at Low Moor Alloy Steelworks Ltd. *British Steelmaker,* v. 24, Feb. 1958, p. 48-50.

(D9g; AY)

116-D. Developments in the European Steel Industries. D. J. O. Brandt. *Iron and Coal Trades Review,* v. 176, Jan. 17, 1958, p. 139-145.

Recent advances in techniques of ironmaking, steelmaking and steel casting in Belgium and Germany. Krupp-Renn Process, new rotor plants, degassing techniques and resistance heating. (D-general; ST)

117-D. (Hungarian.) **Production of Stainless Steels.** Ernö Weigl. *Kohaszati Lapok,* v. 12, July 1957, p. 275-286.

Steel production in induction furnaces. (D5, W18a, 1-52; SS)

118-D. (Hungarian.) **Production of Ferrotungsten in Electric Furnaces.** Antal Horvath. *Kohaszati Lapok,* v. 12, July 1957, p. 292-300.

(D5; AD-n, Fe, W)

119-D. Russian Experience With 500-Ton Open Hearth Furnaces. R. Sewell. *Iron and Steel,* v. 31, Feb. 1958, p. 61-62.

(D2, W18r)

120-D.* (French.) **Gasification With Oxygen-Enriched Air.** R. Alleyrac, L. de Saint Martin, R. Veuve and P. Leroy. *Institut de Recherches de la Siderurgie, Publications,* Series A, no. 173, Sept. 1957, 74 p.

Experiments conducted at Senelle Plant (openhearth) of Societe Lorraine-Escaut showed possibility of achieving a 29% rate of oxygen enrichment of air in gas producers with normal steam consumption, and of 27% in producers supercharged with steam, without any serious difficulty due to fusion of slag. Furnace performance was improved. At constant calorific output, productivity rose from 8.4 tons per hr. for operation with ordinary air to 9.7 for operation at rate of 29% oxygen enrichment, or an increase of 15.5%. Coal consumption decreased 13% under same conditions, costs of fabrication per ton did not increase. 25 ref. (D2g; ST)

121-D. (German.) **Production of Sponge Iron in Intermittently Operated Chamber Kilns of Coke Oven Type.** M. S. Kurtschatow. *Neue Hütte,* v. 2, Nov. 1957, p. 671-678. (Henry Brutcher, Altadena, Calif., Translation no. 4085.)

Direct reduction of iron. 23 ref. (D8j; Fe, 6-74)

122-D. (German.) **Electric Steel Slag Alloying Process.** Kurt Fellcht. *Neue Hütte,* v. 2, Dec. 1957, p. 731-737.

Slag reduction process for melting steel in the basic electric arc furnace. 3 ref. (D5d, D11n; AY)

123-D. (German.) **Production of Special Steels by Slag Alloying Process.** Hans-Joachim Eckstein. *Neue Hütte,* v. 2, Dec. 1957, p. 737-749.

23 ref. (D2d, D11n; AY)

124-D. (German.) **Desulphurization in the Basic Steel Converter.** Karl-Georg Speith, Hans vom Ende and Hans Vosskötter. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 152-156.

16 ref. (D3, D11n, 1-65, 2-60; ST, S)

125-D.* (German.) **Use of Oxygen in an Openhearth Steel Plant.** Wilhelm Gerling and Karl-Otto Zimmer. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 156-160.

Utilization of excess oxygen from generating plant; addition to gas producers; enrichment of combustion air in older type furnace. Increased melting rate and accelerated desulphurization and decarburization of low-carbon steels by use of oxygen lances. 4 ref. (D2g; ST)

126-D. (Hungarian.) **Economical Use of Manganese in Pig Iron and Steel**

Production. Laszlo Visnvoyszky. *Kohaszati Lapok*, v. 12, Jan-Feb. 1957, p. 14-18.

(D1, D2; *Mn*, ST, CI-a)

127-D.* Industry Looks at Direct Reduction. James W. Franklin. *Engineering and Mining Journal*, v. 158, Dec. 1957, p. 84-93.

Advantages of direct reduction of iron ore; description of H-Iron, R-N, Krupp-Renn, Esso-Little, Madaras, Cyclosteel, Wiberg-Soderfors, Norsk-Staal, Domnarfvet Kiln, Sieurin, Hoganas, Monterrey, Cape-Brassert, Shipley and U. S. Steel-Dorr Oliver processes. (D8j, D8n; Fe)

128-D. Blast-Furnace Practice at the Societe Metallurgique de Knutange. Max Brun. *Iron and Coal Trades Review*, v. 176, Jan. 24, 1958, p. 207-209.

Comparison between effects of charging sinter and raw ore in blast furnaces shows advantages of sinter charging in a 30% increase in production, a 300-kg. reduction in quantity charged per ton produced, and improvement in quality of iron. (D1a; Fe, RM-n)

129-D. European Steelmaking Today. Alastair McLeod. *Iron and Steel Engineer*, v. 35, Feb. 1958, p. 133-159.

52 ref. (D-general, A4, A9; ST)

130-D.* Use of Fusite in Desulphurizing Off-Grade Pig Iron. J. Goswami, A. B. Chatterjea and B. R. Nijhawan. *Journal of Scientific and Industrial Research*, v. 16A, Nov. 1957, p. 522-526.

Off-grade pig iron desulphurized with fusite (sodium carbonate) in acid and basic-lined ladles. Desulphurizing in acid-lined ladles was erratic due to the interaction of iron and/or manganese sulphide from the acid lining. The efficiency of desulphurization in basic-lined ladles determined by the initial sulphur content. Effect of desulphurization on mechanical properties. 11 ref. (D9m, D11n; CI-a)

131-D. (German.) Bessemer Converter; 100 Years Ago and Today. Hans Erdelen-Delligsen. *Giesserei-Praxis*, no. 1, Jan. 10; 1958, p. 9-11.

(D3, W18p, A2)

132-D. (German.) Investigation of Metallurgical Processes by Means of Slag Isolation. C. A. Muller and E. Plockinger. *Radex Rundschau*, no. 5-6, 1957, p. 738-753.

Deoxidation was studied in open-hearth and electric furnaces as well as the bessemer converter. 16 ref. (D11r; ST, RM-q)

133-D. (German.) Investigation of Deoxidation of High-Carbon Openhearth Steels With Ferrosilicon, Aluminum and Calcium-Silicon. E. Plockinger and A. Randak. *Radex Rundschau*, no. 5-6, 1957, p. 754-768.

11 ref. (D11r; ST-e, AD-r, *Al, Ca, Mn, Si*)

134-D.* (Italian.) Carbon and Sulphur Reactions and Metal-Slag Equilibrium in the Refining of Steel With Oxidizing Slag. G. Violi. *Metallurgia Italiana*, v. 49, Dec. 1957, p. 805-816.

Oxygen content of steel and carbon-oxygen equilibrium; mechanism and kinetics of decarburizing reaction; metal-slag equilibrium and control of decarburizing reaction; elimination of sulphur; carbon-oxygen equilibrium and sulphur distribution. Study of reactions in basic electric furnace. 23 ref. (D11n, D5; ST)

135-D. (Japanese.) Operation of a 1-Ton Testing Blast Furnace. Kuro Kanamori. *University of Tokyo, Institute of Industrial Science, Report*, v. 6, Sept. 1957, p. 285-352.

Bessemerizing, desulphurizing and removal of Cr. 7 ref. (D1b, D11n, W17g; ST, *Cr, S*)

136-D. Production of Low-Phosphorus Foundry Iron From High-Phosphorus Iron Ores. R. L. Higgins and J. C. Billington. *British Cast Iron Research Association, Journal of Research and Development*, v. 7, Feb. 1958, p. 171-187.

The oxygen top blowing process in a stationary vessel was examined to determine possibility of obtaining dephosphorization without substantially affecting the carbon content of the iron. Emphasis placed on removal of phosphorus, rather than retention of carbon; necessity for extensive recarburization of the dephorized metal. Dephosphorization and recarburization can be carried out in the Kaldo converter with comparatively little phosphorus reversion. There may be several advantages in carrying out the recarburization treatment in a separate unfired vessel. 9 ref. (D10b; CI-a, *P*)

137-D. Direct Reduction Process Is Home. *Chemical and Engineering News*, v. 36, Apr. 14, 1958, p. 48.

Strategic Udy process to make iron from iron ore passes prototype test; characteristics itemized. (D8j; Fe)

138-D. Fast Scrap-Charging Boosts Openhearth Output. G. J. McManus.

Iron Age, v. 181, Mar. 20, 1958, p. 110-111.

(D2a; RM-p, ST)

139-D. Mold Design for Continuous Casting of Steel. G. I. Kozlitin and L. N. Kolyibalov. *Iron and Coal Trades Review*, v. 176, Jan. 3, 1958, p. 31-33. (From *Stal*, no. 3, 1957, p. 209-213.)

Previously abstracted from original. See item 228-D, 1957.
(D9q, W19c, 1-52; ST)

140-D.* (Czech.) **Influence of Metallurgical Process on the Watt Losses of Transformer Sheets.** J. Skala, M. Knotek and R. Vokac. *Hutnické Listy*, v. 13, Jan. 1958, p. 14-21.

With suitable modification of the steel production method involving reladling, standing for 15 min. in the ladle and preliminary deoxidation with 1 kg. Al per ton, watt losses can be decreased 0.07 w. per kg. Effect of position in the ingot and influence of melting silicon content in the melt has the most important effect. 6 ref. (D9m, P15; ST, SGA-n)

141-D.* (French.) **Chromium and Ferrochromium for Alloy Steels.** Ch. Dingeon. *Revue de Metallurgie*, v. 55, Jan. 1958, p. 1-8.

Reduction and refining techniques and equipment; metallurgical reactions involved; properties imparted to steels by alloying with Cr.
(D9r; AY, AD-n, *Cr*)

142-D.* (French.) **New IRSID Process for Refining Irons Containing Phosphorus, Using Pure Oxygen and Lime Powder.** B. Trentini and M. Allard. *Revue de Metallurgie*, v. 55, Jan. 1958, p. 67-74.

New patented process for basic bessemer steels in particular, characterized by complete change in behavior of oxygen jet striking surface of bath, a modification brought about by precise control and regulation of a suspension of finely divided lime carried by the oxygen and used in concentrations varying with nature of iron and given phase of operation. Si content of iron may vary over a wide range, dephosphorization can be advanced with respect to decarburization, and very low phosphorus content can be attained if killed, mild, medium or high-carbon steels are required. 13 ref.
(D3f, 1-65; ST)

143-D.* (French.) **Hydrodynamic and Practical Study of Movement of the Bath in a Bottom-Blow Converter. Pt. 1.** P. Leroy and G. Cohen de Lara. *Revue de Metallurgie*, v. 55, Jan. 1958, p. 75-97.

Systematic examination of geometrical and pneumatic factors influencing "blowability". General interpretation of hydrodynamic phenomena, including physical theory of mass oscillations of bath contained in converter, and some practical conclusions regarding design of bessemer and basic bessemer plants. Primary design requirement for bottom-blown furnaces is as wide a blast zone as possible; hence peripheral blast orifices should be as close as possible to inner boundaries of lining. (To be continued.)
(D3b; ST)

144-D. (German.) **Effect of Electro-Inductive Agitation of the Bath on Metallurgical Reactions in the Electric Arc Furnace.** Karl Georg Speith, Hans vom Ende and Wolfgang Schneider-Milo. *Stahl und Eisen*, v. 78, Feb. 20, 1958, p. 215-220.
15 ref. (D5f)

145-D.* (German.) **Basic Hot Blast Cupola, Openhearth Steel Plant and the L-D Crucible Combined in One Unit.** Adolf Richter, Georg Cohnen and Paul Jacobi. *Stahl und Eisen*, v. 78, Mar. 6, 1958, p. 273-284.

The hot blast cupola is used as a premelting plant for the electric arc furnace with intermittent use of a Linz-Donawitz crucible for special steels. Gas cleaning plant consists of two washers. Capacity of the hot blast cupola is 15 tons per hr.; efficiency with different proportions of openhearth pig iron in the charge. Charging openhearth furnace with molten pig iron; comparisons with and without addition of ore (10-20%). L-D crucible consumes 52 cu.m. per ton 99% oxygen. Construction details, lining wear, operation sequence and time consumption.
(D2, D10a, 1-65; ST)

146-D.* (German.) **Decarburizing Reaction in the Basic Steel Converter During Dephosphorization.** Heinz Pottgiesser. *Stahl und Eisen*, v. 78, Mar. 6, 1958, p. 291-298.

Calculation of adjustment of carbon and oxygen when blowing with air, oxygen-enriched, and mixtures of oxygen and carbonic acid; relation between carbon and nitrogen content in the blown iron; iron content in slag and manganese content in the metal; their relation to the carbon content of the steel bath. 10 ref. (D3, 1-65; ST)

147-D.* (Japanese.) **Effect of Vacuum Melting on Nature of Cast Iron Melt.**

Tadao Sato, Tosjio Hirooka and Hideo Teramura. *Casting Institute of Japan, Journal,* v. 29, Nov. 1957, p. 764-771.

Vacuum melting of Fe-C alloys of hypo and hypereutectic compositions showed decrease in C and S content and increase in Si and P. Oxygen and nitrogen decreased to about 5 ppm. Most common microstructure was fine eutectic graphite in pearlitic and ferritic matrix and carbide network in the boundary of eutectic cells. Microstructure depends on melting temperature, carbon content and/or degree of evacuation. 6 ref.
(D8m, E10, 1-73; ST, CI)

148-D.* (Czech.) **Prerefining of Basic Bessemer Pig Iron With Oxygen.** Ludek Kodrle. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1070-1077.

Prerefining found to be economic under some conditions for iron containing a wide range of Mn and Si. Temperature increase in relation to specific consumption of oxygen. Relationship between Si and Mn content and furnace loss of these elements. 19 ref. (D3f, 1-65; CI-a)

149-D. (German.) **Use and Economy Gained From Openhearth Furnace Automation in Industrial Practice.** Heinz Klepsch. *Neue Hütte,* v. 3, Jan. 1958, p. 20-26.

Automatic chamber adjustment; control of pressure and composition of furnace atmosphere. Advantages of automatic control include decrease in consumption of fuel; increase in furnace efficiency; higher stability of furnace materials and saving in fireproof roofs and linings; closer control of process; more constant operation of furnace.
(D2, W18r, 18-74)

150-D.* (German.) **Control of Openhearth Furnaces, Particularly in Case of Heating With Unpurified Producer Gas.** Gunther Oppelt. *Neue Hütte,* v. 3, Jan. 1958, p. 26-31.

Variables which can be controlled are air-gas mixture, furnace atmosphere pressure, reversing of regenerating chambers; oxygen content in waste gas as criterion of burning process; causes of disturbances in gas head and its influence on control system; automatic correlation between reversing frequency of chambers and thermal condition in furnace. (D2h; RM-m36)

151-D. (Russian.) **Refractories for Bottom of Openhearths.** I. V. Panyushkin and M. K. Musikhina. *Metallurg,* Dec. 1957, p. 20.

Improved slag results from the addition of magnesia to the dolomite refractory. (D2d, W18r; RM-h)

152-D. Gas Turbines for Blast-Furnace Blowing. G. H. Krapf and J. O. Stephens. *American Society of Mechanical Engineers,* Paper no. 58-GTP-14, Mar. 1958, 11 p.
(D1b, W11m, 1-52)

153-D. Novel Oxygen Plant Serves New Steelmaking Process at Jones & Laughlin. *Industrial Heating,* v. 25, Apr. 1958, p. 748-750.
(D10, W10; ST, *O*)

154-D.* R-N Process for Direct Reduction of Iron Ores. *Metal Progress,* v. 73, Apr. 1958, p. 73-77.

Process economically produces iron concentrates which are suitable as feed for blast furnaces, cupolas, openhearths and electric furnaces. Use for treating low-grade ore or with high-grade ore to produce metallics. Full-sized plants designed; combination of an R-N plant with electric furnaces would in many cases be cheaper to operate and involve less investment than a blast furnace-openhearth combination. (D8j, D5g, D1h; Fe, RM-n)

155-D. Vacuum-Melted Steel, Titanium and Zirconium. *Metal Treatment and Drop Forging,* v. 25, Feb. 1958, p. 74-76.
(D8m, C25; ST, Ti, Zr)

156-D. Gas Atomizes Openhearth Fuel. V. B. Thompson. *Steel,* v. 142, Apr. 14, 1958, p. 144-147.

Natural gas under high pressure is used to atomize fuel oil as it is injected into the furnace combustion chamber. (D2g, W18r; RM-k)

157-D. Noise Measurements for Control and Conduction of the Blow in the Bessemer Process. Pt. 1-2. J. Klarding. *Metall,* v. 9, Sept. 1955, p. 780-793; v. 10, May 1956, p. 405-415. (Iron and Steel Institute, Translation no. 622.)

Previously abstracted from original. See item 344-D, 1955.
(D3; ST)

158-D. Supervision and Control of the Basic Bessemer Process by Evaluation of Temperature Radiation of the Bath and the Spectrum of the Converter Flame. Franz Wever. *Stahl und Eisen,* v. 75, May 5, 1955, p. 549-559. (Iron and Steel Institute, Translation no. 788.)

Previously abstracted from original. See item 212-D, 1955. (D3)

159-D. (French.) **Large Arc Furnaces Used in Steelmaking.** M. Petitdidier. *Journal du Four Electrique,* v. 63, Jan-Feb. 1958, p. 19-26.

32 ref. (D5, W18s)

160-D.* (German.) **Investigation on the Speed of Separation of Primary Deoxidation Products From Iron Heats.** Wilhelm Anton Fischer and Manfred Wahlster. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 601-609.

The velocity of segregation of primary deoxidation products in mild steel heats was investigated in middle-frequency crucible furnaces after the addition of silicon. Si and oxygen contents were determined every 2 min. The velocity of segregation is dependent on percentage of Si added, furnace temperature; size of furnace; furnace linings; presence or lack of stirring motion. 19 ref. (D11r; ST, 9-69)

161-D.* (German.) **Newest Developments in the Field of Fe-Cr Metallurgy.** G. Volkert. *Metall,* v. 11, Oct. 1957, p. 846-848.

Various processes were developed to obtain ferrochromium as alloying component for steel. For high carbon content (1-10% C) a low-shaft furnace is used, coal being the reduction agent. Low MgO content of the ore is desirable to prevent sticky slags. For low carbon content a 3-stage method is employed using three electric furnaces and high-silicon Cr ores. 5 ref. (D5, D8n, AY, *Cr,* AD-n)

162-D. Studies of the Permeability of Blast-Furnace Burden Materials. J. M. Ridgion. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 317-320.

Relationship between pressure drop and air flow in beds of broken solids. Various discrepancies are noted with special reference to the peculiarities of layered systems of different sizes, and it is concluded that quantitative predictions of the behavior of beds of solids are not reliable. 5 ref. (D1a)

163-D. Investigation of Stresses on Units of the Continuous Casting Installations for Steel. V. F. Shchukin. *Stal',* no. 4, 1957, p. 320-321. (Iron and Steel Institute, Translation no. 536.)

Previously abstracted from original. See item 232-D, 1957. (D9q, 1-52; ST)

164-D. Properties of O.H. Steel Processed With Oxygen. D. S. Kazarnovskii. *Stal',* no. 2, 1957, p. 152-157. (Iron and Steel Institute, Translation no. 539.)

Previously abstracted from original. See item 336-D, 1957. (D2g; Q-general; ST-e)

165-D. Continuously Cast Products for Rolling Mill and Forge. Joseph Hofmaier. *Stahl und Eisen,* v. 77, Jan. 24, 1957, p. 69-78. (Iron and Steel Institute, Translation no. 572.)

Previously abstracted from original. See item 83-D, 1957. (D9q; ST, 4-52)

166-D. Improvement of the Quality of Ingots With Ultrasound. N. P. Nikolaichik and E. N. Nikolaichik. *Stal',* no. 4, 1957, p. 322-325. (Iron and Steel Institute, Translation no. 598.)

Previously abstracted from original. See item 224-D, 1957. (D9, 1-74; ST)

167-D. Results of New Studies Made With O.H. Furnaces and Particularly With Those of the Maertz Type. Reinhold Baake and Harry Stollberg. *Neue Hütte,* v. 2, Feb-Mar. 1957, p. 157-168. (Iron and Steel Institute, Translation no. 616.)

Previously abstracted from original. See item 207-D, 1957.

168-D. Use of Oxygen in Refining Pig Iron. Walter Bading. *Stahl und Eisen,* v. 77, July 11, 1957, p. 926-931. (Iron and Steel Institute, Translation no. 620.)

Previously abstracted from original. See item 207-D, 1957. (D10, D1h, D2g, D3f; ST)

169-D. Detonation and Shock Wave. (Report 301 of the Blast-Furnace Committee of V.D.E.) Michael Hansen. *Stahl und Eisen,* v. 77, June 13, 1957, p. 805-813. (Iron and Steel Institute, Translation no. 636.)

Previously abstracted from original. See item 187-D, 1957. (D11j, D1)

170-D. Dephosphorization of Basic Converter Steel to Very Low Contents of Phosphorus. Hans Kosmider and Hermann Schenck. *Stahl und Eisen,* v. 77, July 11, 1957, p. 917-926. (Iron and Steel Institute, Translation no. 637.)

Previously abstracted from original. See item 208-D, 1957. (D3d, D11n; ST, RM-g)

171-D. Use of a Low-Carbon Cast Iron Prepared in the Hot-Blast Cupola as an Openhearth Charge. R. Boutigny and C. Barbazanges. *Circulation Information Tech.,* no. 1, 1955, p. 169-192. (Iron and Steel Institute, Translation no. 650.)

Previously abstracted from original. See item 131-D, 1955. (D2, E10, C1)

172-D. Chemical Equilibria in the Basic Bessemer Converter. Alfred Decker. *Archiv für das Eisenhüttenwesen,* v. 28, Feb. 1957, p 57-64. (Iron and Steel Institute, Translation no. 654.)

Previously abstracted from original. See item 139-D, 1957. (D3, D11s; ST)

173-D. Smelting of Ferromanganese in Large Blast Furnaces. A. F. Zakharov. *Stal',* no. 7, 1957, p. 580-584. (Iron and Steel Institute, Translation no. 670.)

Previously abstracted from original. See item 339-D, 1957. (D1; Fe, Mn, AD-n)

174-D. Smelting of Fluxed Sinter Made From Krivoi Rog Iron Ores. I. V. Raspopov. *Stal',* v. 17, Feb. 1957, p. 99. (Iron and Steel Institute, Translation no. 681.)

Previously abstracted from original. See item 334-D, 1957. (D1a, B16a; Fe, RM-n)

175-D. Experiences and New Findings in Refining of Basic Bessemer Pig Iron by Blowing With Pure Oxygen. Friedrich Springorum. *Stahl und Eisen,* v. 77, Sept. 19, 1957, p. 1284-1296. (Iron and Steel Institute, Translation no. 710.)

Previously abstracted from original. See item 344-D, 1957. (D3f; ST)

176-D. Trends in the Refining of Phosphorus-Rich Iron With Oxygen. Heinrich Rellermeyer. *Stahl und Eisen,* v. 77, Sept. 19, 1957 p. 1296-1303. (Iron and Steel Institute, Translation no. 711.)

Previously abstracted from original. See item 345-D, 1957. (D10a; ST)

177-D. Automation in the Iron and Steel Industry. Reinhold Perlick. *Neue Hütte,* v. 2, Feb-Mar. 1957, p. 92-102. (Iron and Steel Institute, Translation no. 724.)

Previously abstracted from original. See item 183-D, 1957. (D-general; F23, 18-74)

178-D. Hot Blast Cupola Furnace in Openhearth Practice. Albert-Friedrich Oberhofer. *Stahl und Eisen,* v. 77, May 16, 1957, p. 643-651. (Iron and Steel Institute, Translation no. 727.)

Previously abstracted from original. See item 180-D, 1957. (D2; 1-52)

179-D. Mechanism of Top Blowing. Rudolph Hammer. *Stahl und Eisen,* v. 77, Sept. 19, 1957, p. 1303-1308. (Iron and Steel Institute, Translation no. 733.)

Previously abstracted from original. See item 346-D, 1957. (D10a; ST)

180-D. Hydrodynamics of (Proof of Convection in) Liquid Steel in Ingot Molds. A. A. Zborovskii. *Stal',* no. 1, 1957, p. 24-30. (Iron and Steel Institute, Translation no. 787.)

Previously abstracted from original. See item 330-D, 1957. (D9k, 1-54; ST)

181-D.* (French.) **Electrical Smelting of Iron Ore.** K. Sandvold, F. C. Collin and J. Gunderson. *Chimie et Industrie,* v. 79, Feb. 1958, p. 144-149.

Development of electric furnace process in Norway and elsewhere. Importance of raw material preparation (concentration, sintering, preheating) for modern electric furnace operation. Possibilities of future competition between these and coke-fired blast furnaces. 7 ref. (D8n; Fe)

182-D.* (French.) **New Method of Improving Blowability in Thomas Converters.** B. Trentini, P. Vayssiere, D. Jorre and M. Gombert. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 168, June 1957, 12 p.

Process permits insufflation of very diverse types of powdered materials under standard operating conditions of Thomas converter. At beginning of refining process, limited amount of powdered lime is injected into charge. Almost instantaneous action of this powder reaching place where oxygen of the blast reacts on bath prevents foaming of primary slag and thus improves blowability during critical blast period. Lime injection must be closely controlled. Silicon content of pig can exceed 1.5%; initial charge can be greater; time saving results; there is practically no increase in nitrogen content of steel. 5 ref. (D3b, 1-65; ST)

183-D.* (French.) **Conference on Energy (Metz, June 6, 1957).** *Revue de Metallurgie,* v. 55, Feb. 1958, p. 179-185.

Summary of eight papers on energy problems arising in blast furnaces and basic bessemer steel plants. Coke economy, large and small blast furnaces, preheating of the blast, energy balance in iron works; heat balance in basic bessemer conversion, in melting of scrap, energy consumption in basic bessemer plant; recovery of heat

from flame of basic bessemer converter. (D1, D3b, 1-65, A11e; ST)

184-D.* (French.) **Hydrodynamic Study of Bath Movements in Bottom-Blown Converters. Pt. 2.** P. Leroy and G. Cohen de Lara. *Revue de Metallurgie*, v. 55, Feb. 1958, p. 186-200.

Geometrical and pneumatic factors influencing blowability. 7 ref. (D3b)

185-D. (Russian.) **Increasing the Productivity of Blast Furnaces.** *Metallurg*, Jan. 1958, p. 1-2.

(D1)

186-D. (Russian.) **Casting With Liquid Pig Iron.** P. V. Gubchevskii. *Metallurg*, Jan. 1958, p. 3-5.

(D1c)

187-D. (Russian.) **Effect of Refractory Materials on Contamination of Ball Bearing Steel.** M. I. Vinograd, M. A. Lyubinskaya and N. D. Orekhov. *Metallurg*, Feb. 1958, p. 12-15.

Tests with fireclay, kaolin and high-alumina oxide used for refractory lining show that fireclay gives highest nonmetallic inclusions. (D2; ST, SGA-c, RM-h35, 9-69)

188-D. (Russian.) **Deoxidation of Rail Steel With Aluminum.** N. I. Shirokov and B. G Petukhov. *Metallurg*, Jan. 1958, p. 17-21.

(D9r, D11r; ST, *Al*)

189-D. (Russian.) **Overloading Steel Smelting Electric Arc Furnaces.** E. I. Astrov. *Metallurg*, Jan. 1958, p. 21-22.

How to get the maximum production out of 15 and 20-year old electric arc furnaces by establishing the correct relation between capacity of transformers and dimensions of furnace. (D5a)

190-D. (Russian.) **Performance of Openhearth Furnaces With High Calorie, Low Pressure Gas.** V. S. Kocho, V. I. Grankovskii, Yu. D. Molchanov and E. A. Ploshchenko. *Metallurg*, Feb. 1958, p. 9-12.

Reduction by one-half of low-calorie coke gas while retaining same volume of fuel oil and blast furnace gases increases the theoretical temperature and augments productivity of furnace. (D2h, W18r; RM-m)

191-D. Electric Furnace Steel Manufacturing. W. E. Lewis. *Iron and Steel Engineer*, v. 35, Mar. 1958, p. 98-102.

Electric furnace equipment and capabilities in Western U. S. Cost estimates. (D5, 1-52, 17-53; ST)

192-D. Ferrocoke and Its Use in the Blast Furnace. D. S. Kashchenko and S. A. Sazonov. *Koks I Khimiya*, no. 6, June 1956, p. 21-26. (Henry Brutcher, Altadena, Calif., Translation no. 4007.)

(D1b; Rm-j43)

193-D. Study of Conditions of Heat Exchange and Reduction (in Blast Furnaces) Working on Fluxed Sinter. N. N. Babarykin and F. A. Yushin. *Stal'*, v. 17, no. 1, 1957, p. 7-15. (Henry Brutcher, Altadena, Calif., Translation no. 4066.)

Previously abstracted from original. See item 327-D, 1958. (D1a; Fe, RM-q)

194-D. Influence of Catalysts on the Reduction of Iron Ores With Hydrogen. W. Machu and S. Y. Ezz. *Archiv für das Eisenhüttenwesen*, v. 27, no. 7, 1957, p. 367-371. (Henry Brutcher, Altadena, Calif., Translation no. 4067.)

Previously abstracted from original. See item 290-D, 1957. (D8j, Fe, NM-c)

195-D. Fundamental Considerations About the Production of High-Grade Killed Steel. H. Schenck. *Stahl und Eisen*, v. 77, no. 21, 1957, p. 1442-1450. (Henry Brutcher, Altadena, Calif., Translation no. 4079.)

Previously abstracted from original. See item 23-D, 1958. (D2, D11n, ST-d)

196-D. New Deoxidizing and Desulphurizing Practice for Improved Steel Quality. V. A. Skachko and N. P. Merenkov. *Stal'*, v. 17, no. 6, 1957, p. 521-522. (Henry Brutcher, Altadena, Calif., Translation no. 4080.)

Previously abstracted from original. See item 300-D, 1957. (D9r, ST, *Al*)

197-D. Sources of Oxide Inclusions in Steel During Tapping and Pouring. E. N. Malinovskii and A. N. Morozov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 8, Aug. 1957, p. 102-108. (Henry Brutcher, Altadena, Calif., Translation no. 4081.)

(D9p, 9-69, 14-68)

198-D.* (English.) **The Importance of Vacuum Casting in the Steel Industry.** F. Kinsky and Z. Kletecka. *Czechoslovak Heavy Industry*, no. 2, 057, p. 3-21.

Effect of hydrogen content on properties of steel, experimental results obtained in vacuum casting of steel ingots including effects of dendritic structure, grain size, oxide inclusions, occurrence and character of segregations, hydrogen content and resultant mechanical properties. 7 ref. (D8m; ST, 9-69)

199-D.* (French.) **Gasification With Oxygen-Enriched Blast Air.** R. Alleyrac, L. de Saint Martin, R. Veuve and P. Leroy. *Publications de l'Institut de Recherches de la Sidérurgie,* Series A, no. 173, Sept. 1957.

Use of oxygen-enriched air for the blast furnace. A gain in the lower calorific value of the dry and purified gas of 350 k.-cal. per sq. m. is obtained in using 29% oxygen-enriched air in place of ordinary air. Furnace performance is likewise improved; a 15.5% gain in tons per hr. produced is obtained with the enriched as compared with the normal air. Also a gain in coal consumption. In general, production cost tends to decrease. (D1h)

200-D. (German.) **Operational Results Obtained When Blowing Basic Converter Heats by the IRSID Opacimeter.** Hans von Ende and Gustav Mahn. *Stahl und Eisen,* v. 78, Apr. 3, 1958, p. 412-416.

4 ref. (D3b, 1-65, 1-54; ST)

201-D. (Hungarian.) **Metallurgical and Economic Effect of Steam Injection on the Blast-Furnace Operation.** Farkas Otto. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 1-6.

(To be continued.) (D1h)

202-D. (Hungarian.) **Different Methods for Preventing Pipe in Steel Ingots.** Csabalik Gyula. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 20-23.

5 ref. (D9k, 9-67; ST)

203-D.* (Russian.) **Use of Oxygen in Small Converters.** B. A. Andreyev. *Liteinoe Proizvodstvo,* Mar. 1958, p. 4-7.

Experimental melting with oxygen blast. Three stages of process: deoxidation of melt; alloying of cast iron in ladle; provision of suitable composition of starting metal. Optimal conditions of process. (D3f, D9r; ST)

204-D. (Russian.) **Processes in the Blast Furnace at Top Gas and High-Pressure Operation.** B. F. Goncharov. *Stal',* Feb. 1958, p. 97-104.

Increase of top gas pressure, when using a burden containing 75-85% fluxed sinter, is accompanied by a considerable acceleration of the reduction processes of iron oxides in zones above level of tuyeres. 9 ref. (D1h)

205-D. (Russian.) **Automatic Control of Gas Distribution in the Blast Furnace.** I. A. Suchkov and V. V. Burtsev. *Stal',* Feb. 1958, p. 110-113.

5 ref. (D1f, 18-74)

206-D. (Russian.) **Four-Period System of the Complex Automatic Control for a Fuel-Oil-Fired Openhearth Furnace.** V. P. Borodin, P. E. Darmanian, A. A. Yudson and A. V. Vasil'ev. *Stal',* Feb. 1958, p. 114-120.

Replacement of two-period system by the four-period system brings performance of control system closer to optimum level of furnace. (D2h, RM-k30 18-74)

207-D. (Russian.) **Development of Melting and Pouring Technology for High-Chromium-Nickel-Molybdenum Steel.** V. I. D'iachkov, P. V. Umrikhim, S. G. Slesarev and I. G. Fadeev. *Stal',* Feb. 1958, p. 120-126.

A sharp reduction of rejected billets and finished products has been achieved by alloying of the boiling bath with ferrochrome and pouring of steel by use of frames. 8 ref. (D9p, D9r; SS, AD-n31)

208-D. (Russian.) **Production of Two-Layer Ingots and Slabs.** V. A. Filonov, A. A. Podgorodetskii, F. A. Ksenzuk and V. N. Lola. *Stal',* Feb. 1958, p. 188-191.

(D9)

209-D.* (Swedish.) **Gaseous Mixing in Connection With Combustion in Metallurgical Furnaces.** Erik E. Sjöstrand. *Jernkontorets Annaler,* v. 142, Jan. 1958, p. 15-33.

Critical review of work published in the last 20 years covering gaseous mixtures, openhearth furnaces, port design, gas transit time, gas flow, application of aerodynamics to openhearth development and photographic techniques in combustion research. 20 ref. (D2, D11j)

210-D. Equilibria of Molten Iron and Liquid Slags of the System CaO-SiO_2-FeO. H. L. Bishop, Jr., N. J. Grant and J. Chipman. *AIME Transactions,* v. 212, Apr. 1958, p. 181-192.

Lime and dicalcium silicate crucibles were equilibrated with molten iron and liquid slags containing iron oxide and small amounts of sulphur. Oxygen content of metal, iron oxide activities and desulphurization val-

ues of the slags were determined in the temperature range 1530 to 1700° C. Influence of magnesia in the slag and the temperature dependence of the solubility of lime in liquid iron oxide and the ferric oxide content were established. 17 ref. (D11n, D2d, P12, Fe)

211-D. The Behavior of Chromium in Slag-Metal Systems Under Reducing Conditions. C. W. McCoy and W. O. Philbrook. *AIME Transactions,* v. 212, Apr. 1958, p. 226-235.

Reduction of chromous oxide from lime-silica-alumina slags by carbon-saturated iron behaves as a first-order process substantially independent of slag composition and temperature over an important range for iron smelting. 16 ref. (D11n, ST, *Cr*)

212-D. Russian Experience With 500-Ton Open Hearth Furnaces. R. Sewell. *Blast Furnace and Steel Plant,* v. 46, Apr. 1958, p. 50-52.

(D2, W18r)

213-D. New Trends in Firing Practices for Open Hearth Furnaces. James E. Goodin. *Blast Furnace and Steel Plant,* v. 46, Apr. 1958, p. 389-390.

Experiences and results using high-pressure natural gas to replace steam as atomizing agent in open-hearth furnaces; safety equipment. (D2, W18r; RM-m)

214-D. Gary Works' Experiences With Quartzite Blow-Outs. R. E. Turman and T. A. Young, Jr. *Blast Furnace and Steel Plant,* v. 46, Apr. 1958, p. 391-395.

Experiences with three quartzite-type blast furnace blow-outs illustrate advantages. Conditions for satisfactory quartzite blow-outs are: quartzite burden interface occurring above the mantel; 20% reduction of burden in advance of lowering blast temperature to 600° F.; filling sequence to maintain quartzite at correct level; quartzite temperatures measured and maintained below 2500° F.; quartzite particle size ranging from 1 to 2 in. with minimum of fines. (D1, W17g)

215-D. Use of Oxygen in the British and European Steel Industries. D. J. O. Brandt. *Iron and Coal Trades Review,* v. 176, Jan. 1958, p. 263-271.

18 ref. (D-general, D10; ST, *O*)

216-D. Titanium-Bearing Stainless Steel. Slag Washing Process. *Iron and Coal Trades Review,* v. 176, Mar. 28, 1958, p. 751.

As molten stainless steel flows through the high-temperature slag, a washing action is developed, and this cleans the steel of any contaminants. When the molten steel rises in the mold, the slag forms a protective covering over the entire surface preventing air oxidation. The extremely hot slag also retards the rate of solidification, allowing any remaining contaminants to float to the top where they can be discarded. (D11n; SS, *Ti*)

217-D.* High-Phosphorus Pig Iron Refined With Lime and Oxygen. B. Trentini and M. Allard. Digest of paper presented before the 15th annual A.I.M.E. Electric Furnace Steel Conference, Feb. 1958. *Metal Progress,* v. 73, May 1958, p. 145-146, 148.

It is now possible to produce steel from high-phosphorus pig iron by the basic oxygen process. When lime powder is injected along with oxygen blast, the phosphorus is fluxed away and the steel is fully equivalent to that produced in the openhearth. (D3b; ST)

218-D.* Modern Trends in Iron and Steel Making. E. Klein. *South African Mechanical Engineer,* v. 7, Feb. 1958, p. 203-224.

Increase in iron production by larger number of units, larger units, better exploitation of existing units; physical burdening, high top pressure. Ore agglomeration by sintering and pelletizing; ore bedding; upgrading of ore by beneficiation; heavy media separation, cyclone; roasting and magnetic separation; enriched blast; low-shaft furnace. Steelmaking pneumatic processes, new concepts through application of oxygen; L. D., Graef Rotor and Kaldo process; electric arc furnace; openhearth process. (D-general)

219-D. Study of the Effects of Vacuum Melting on 550° F. Tempering Embrittlement. M. Gensamer. Columbia University. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131358, Jan. 1957, 41 p. $1.25.

At 550° F., temper embrittlement, common in alloy steel, can be eliminated in SAE 1340 through purification by vacuum melting in a system embodying the principles of the molecular still. (D8m, Q26s; ST)

220-D. Use of Compressed Air for a Sharper Flame in the Openhearth Furnace. M. G. Kozhanov and G. B.

Rogov. *Metallurg*, v. 1, no. 7, 1956, p. 18-21. (Henry Brutcher, Altadena, Calif., Translation no. 3916.)

(D2g, D2h)

221-D. Effect of Increased Top Pressure in Blast Furnace Upon Composition of Pig Iron Produced. V. L. Pokryshkin. *Stal'*, v. 17, no. 6, 1957, p. 487-492. (Henry Brutcher, Altadena, Calif., Translation no. 4052.)

(D1h, 3-74; CI-a)

222-D. Possibilities of Producing Sponge Iron in Batch-Type Chamber Furnaces. (Coke Ovens.) M. S. Kurchatov. *Neue Hütte*, v. 2, no. 11, 1957, p. 671-678. (Henry Brutcher, Altadena, Calif., Translation no. 4085.)

Production of dense strong sponge iron by reduction of hematite, magnetite or brown ores of various reducibilities with several kinds of solid fuel (wood charcoal, bituminous coal, coke, lignite, anthracite). Quality of sponge iron obtained as function of proportion of ore in mix. (D8j; Fe, 6-74)

223-D. Fluxed Sinter With an Increased Magnesia Content. A. I. Gamayurov and A. G. Neyasov. *Stal'*, v. 17, no. 1, 1957, p. 20-24. (Henry Brutcher, Altadena, Calif., Translation no. 4087.)

Previously abstracted from original. See item 329-D, 1957.
(D1a, B16a; Fe)

224-D. Ferrocoke and Ore-Coal Briquets. M. S. Kurchatov. *Stal'*, v. 17, no. 2, 1957, p. 103-105. (Henry Brutcher, Altadena, Calif., Translation no. 4090.)

Previously abstracted from original. See item 335-D, 1957. (D1a; Fe)

225-D. Injection of Powdered Coal Into Blast Furnace Hearth. V. I. Loginov. *Stal'*, v. 16, no. 8, 1956, p. 675-682. (Henry Brutcher, Altadena, Calif., Translation no. 4092.)

Theoretical considerations about the possibilities and advantages of lowering the coke rate in blast-furnace operation by blowing powdered coal directly into the hearth zone through the tuyeres.
(D1c; RM-j43)

226-D. Elimination of Copper From Molten Pig Iron. K. Ueno. *Tetsu to Hagane*, v. 43, no. 3, 1957, p. 265-266. (Henry Brutcher, Altadena, Calif., Translation no. 4101.)

Laboratory study of conditions under which sodium sulphide or sulphate can be used for removing residual Cu from pig iron.
(D2b; *Cu*, Fe)

227-D. Trials With Ferrocoke in the Blast Furnace. Y. Shiraishi. *Tetsu to Hagane*, v. 43, no. 3, 1957, p. 351-352. (Henry Brutcher, Altadena, Calif., Translation no. 4102.)

(D1a; RM-j43)

228-D. Production Experience With Transformer Steel E 320. G. M. Borodulin. *Metallurg*, v. 1, no. 3, 1956, p. 14-16. (Henry Brutcher, Altadena, Calif., Translation no. 4129.)

Previously abstracted from original. See item 210-D, 1956. (D5; ST)

229-D. Importance of Vacuum Casting of Steel to Industrial Practice. Pt. 2. Z. Eminger, F. Kinsky and Z. Kletecka. *Hütnicke Listy*, v. 12, no. 8, 1957, p. 755-768. (Henry Brutcher, Altadena, Calif., Translation no. 4139.)

Previously abstracted from original. See item 21-D, 1958.
(D9, 1-73; ST)

230-D. Influence of Pouring (Ladle) Refractories on the Formation of Macro and Micro Inclusions in High-Carbon Chromium Steel. Pt. 1. Y. Kotani. *Tetsu to Hagane*, v. 43, no. 9, 1957, p. 89-90. (Henry Brutcher, Altadena, Calif., Translation no. 4155.)

(D9, 9-69; SS-a, RM-h)

231-D. Reduction of Lump Ores by Gas From the Blast-Furnace Bosh Zone. Y. Takahashi. *Tetsu to Hagane*, v. 43, no. 9, 1957, p. 1015-1017. (Henry Brutcher, Altadena, Calif., Translation no. 4156.)

Laboratory tests of ores and sinters for reducibility conducted under conditions simulating actual blast furnace operating conditions.
(D1a; RM-n)

232-D. Production of Structural Steels in Arc Furnace With a Very Short Oxidizing Stage. F. P. Edneral and N. F. Khlystov. *Stal'*, v. 18, no. 1, 1958, p. 43-48. (Henry Brutcher, Altadena, Calif., Translation no. 4165.)

(D5; ST, SGB-s)

233-D. Economic Evaluation of Steelmaking Processes. R. V. Bregman. *Stal'*, v. 17, 1957, p. 268-272. (Iron and Steel Institute Translation no. 541.)

Previously abstracted from original. See item 249-D, 1957.
(D3, D2, 17-3; ST)

234-D. Prospects for Use of Calculating Machines for Automatic Control of Blast Furnace Running. I. A. Rylov. *Stal'*, no. 6, 1957, p. 488-493. (Iron and Steel Institute Translation no. 653.)

Previously abstracted from original. See item 294-D, 1957. (D1, X14, 1-52)

235-D. The Effect of Impurities in Steel on the Magnetic Reversal Losses in Hot Rolled Transformer Plate. Theodor Bruggemann. *Neue Hütte*, v. 2, July 1957, p. 404-409. (Iron and Steel Institute, Translation no. 947.)

Previously abstracted from original. See item 276-D, 1957. (D-general, F23, P16; ST, 4-3)

236-D. (French.) **Continuous Primary Purification of the Molten Iron in the Runner of a Blast Furnace by Blowing Pure Oxygen Through Porous Slabs.** P. Leroy and R. Simon. *Publications de l'Institut de Recherches de la Sidérurgie*, Series A, no. 172, Dec. 1957, 20 p.

Sufficiently high oxygen densities for required purification can be used without danger of breakdown of the cement slabs or the appearance of red smoke. (D1h)

237-D. (French.) **Sulphur Absorption Capacity and Constitution of Blast Furnace Slags in the Liquid State.** Traian T. Negrescu. *Revue de Métallurgie (Bucarest)*, v. 2, 1957, p. 5-59.

Quantitative relations for the ionic groupings that arise in a mass of molten silicates. Constitution and formation kinetics of several of these ionic groupings of liquid solutions, of which all molten metallurgical slags are constituted, are traced along general lines. 35 ref. (D11n, N14; RM-q)

238-D.* (French.) **Some Physicochemical Aspects of the Corrosion of Refractory Materials. (Conclusion.)** G. van Gijn. *Silicates Industrielles*, v. 23, Mar. 1958, p. 137-139.

Effect in steelmaking of a liquid slag on a porous solid and on a refractory. 30 ref. (D11, ST, RM-h, RM-q)

239-D.* (Japanese.) **Measurement of Gas Temperature in Blast Furnace Operation and Its Utilization.** Masamoto Nose and Kenichi Kasai. *Sumitomo Metals*, v. 9, Oct. 1957, p. 196-206.

Measurement of temperature, analysis and velocity continuously provides effective control. A German-type gas sampler was employed. Mechanism and operating methods; relation between CO and CO_2 content and gas temperature; temperature classification of gas distribution, ideal, normal and abnormal; influence of size and kind of charged material on gas distribution; estimation of permeability by measuring pressure. (D1b, S18q)

240-D. (Rumanian.) **Desulphurizing Power of Blast Furnace Slags. Sulphur Absorption Capacity of the Slags of the System SiO_2-CaO-FeO in the Liquid State at 500° C.** Traian T. Negrescu. *Studii si Cercetari de Metalurgie*, v. 2, no. 1-2, 1957, p. 37-68.

19 ref. (D1, D11n; Fe, *S*)

241-D. (Rumanian.) **Desulphurizing Power of Blast Furnace Slags. Pt. 6. Sulphur Absorption Capacity of the Slags of the System SiO_2-CaO-MnO in the Liquid State at 1425° C.** Traian T. Negrescu. *Studii si Cercetari de Metalurgie*, v. 2, no. 3, 1957, p. 265-288.

7 ref. (D1, D11n; *S*)

242-D.* (Russian.) **Improved Blast Furnace Charging Bell.** Yu. A. Popov, K. G. Umrikhin and A. K. Shaposhnikov. *Stal'*, Jan. 1958, p. 7-14.

Charging bell meets all operational requirements and has the following advantages: spreads the charge concentrically according to size and chemical composition; maintains continuous radial distribution; avoids necessity of sealing the rotary distributor; simplifies furnace management; increases production and lowers coke consuption. (D1a, 1-52)

243-D. (Russian.) **Smelting of Low-Manganese Iron From Krivoy Rog Ore With Donetz Coke.** P. G. Glazkov, N. E. Dunaev, A. G. Kuzub and G. A. Panev. *Stal'*, Jan. 1958 p. 14-20.

Effective smelting of low-manganese iron depends on the tenor of the Mn ore, production of slag with correct composition, the use of metal additives, Mn content of the cast iron and basicity of the slag. To hold sulphur within acceptable range the basicity of the final slag was increased by raising its alumina content to 8.5% and that of magnesia to 2.5%. 7 ref. (D1, D11n; Fe, *Mn*)

244-D.* (Russian.) **The Quality of Steel Produced From Cast Iron**

Smelted With Constant Moisture Air Blast. M. I. Kolosov, A. N. Morozov, A. I. Stroganov, Yu. A. Popov, O. Ya. Vainshtein and N. V. Keis. *Stal'*, Jan. 1958, p. 24-27.

Introduction of constant moisture air blast in the production of high-quality steel did not cause undesirable increase in hydrogen content nor tendency toward cracking. Macrostructure and physical properties of the steel produced do not depend on the method of smelting. 6 ref. (D1)

245-D.* (Russian.) **Production of Tube-Steel by the Scrap Process From Low-Manganese Cast Iron With Different Manganese Content in the Melt.** A. I. Pastukhov, K. M. Petrov and A. M. Danilov. *Stal'*, Jan. 1958, p. 28-34.

Experimental results proved the necessity of maintaining the required Mn content in the melt during the entire heat in place of the usual addition of ferromanganese. Speed of burning out carbon, desulphurization and dephosphorization of the metal, chemical content of the slag, gas and nonmetallic inclusions in the metal and its phyical properties. 21 ref.
(D2, D9r; ST)

246-D.* (Russian.) **Production of Ball-Bearing Steel in Acid Openhearth Furnace Fired With Natural Gas Mixed With Fuel Oil.** A. A. Kiselev, M. P. Lapshova and M. N. Kul'kova. *Stal'*, Jan. 1958, p. 35-40.

Shifting the production of ball-bearing steel, ShX 15, to openhearth furnaces fired with fuel oil-enriched natural gas resulted in greater purity of the metal and reduced the interval between tappings to 35 min. Technical factors affecting contamination of steel, nature and content of nonmetallic inclusions.
(D2, 1-64; ST, SGA-c, RM-k, RM-m)

247-D.* (Russian.) **Intensification of Oxidizing Period in Electric Furnace Melting of Structural Steel.** F. P. Edneral and N. F. Khlistov. *Stal'*, Jan. 1958, p. 43-48. (Also Henry Brutcher, Altadena, Calif., Translation no. 4165.)

The oxidizing period was reduced by 30% with injection of oxygen at the end of the period to assure proper dephosphorization and decarbonization. It is recommended that the basicity of the slag in the melt be less than 2.2, and the heat of the metal 1500° C.
(D5c; ST, SGB-s)

248-D. (Spanish.) **Processes Used in Direct Iron Ore Reduction.** Eduardo Aguilar. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 101-109.

(D8j, Fe)

249-D. (Spanish.) **Sponge Iron Use in a Low-Shaft Blast Furnace in Mexico.** J. W. Ehrenberg. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 183-188.

Kombinat steel plant; processes; advantages and disadvantages of use of sponge iron. Production of sponge in rotating blast furnace using iron ore with 0.46% Al_2O_3, 0.50% CaO and 0.017% S. Construction and operation of a rotating blast furnace. Low-blast furnace installation.
(D8n, W17g, W17h; Fe, 6-74)

250-D. (Spanish.) **Heating a New Roof in an Openhearth Furnace.** M. Dominguez S. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 221-225.

(D2, W17r; NM-h)

251-D. (Spanish.) **Electrical Production of Pig Iron and Steel.** Charles G. Dauchat. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 251-260.

Thermal blast furnace and comparison with low-shaft furnace; production costs; process in openhearth furnace. 8 ref.
(D8n, D5, W17; Fe, ST)

252-D. (Spanish.) **Scrap Substitution in Steel Melting.** C. B. Schmidt. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 267-269.

(D-general; RM-p)

253-D. Exothermics Raise Ingot Yields. Pt. 2. Drop-In Feeders. G. N. Cherry. *British Steelmaker*, v. 25, May 1958, p. 141-147.

(D9k; W19e)

254-D. Increasing Blast-Furnace Smelting Rates. Russian Practices. R. Sewell, Translator. *Iron and Coal Trades Review*, v. 175, Nov. 8, 1957, p. 1075-1077. (From *Metallurg*, Aug. 1957.)

(D1)

255-D.* **Direct Reduction Is Closer.** *Steel*, v. 142, Mar. 17, 1958, p. 102, 104, 107.

The R-N Process for direct reduction of iron ore. Two different products are made. One is a high-grade product containing more than 90% metallic iron and less than 3% silica. The other is a standard prod-

uct (80-85% metallic iron, 4-8% silica) which is roll-pressed into peach-seed briquets for blast furnace feed. (D8j; Fe)

256-D. (French.) Current British Practice in Operation of Martin Furnaces Equipped With Gas Producers. G. Husson. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Ser. B, no. 32, Apr. 1957, 18 p.

Report of visit to three plants. Furnaces, gas producers, control equipment. (D2, W18r; ST)

257-D. (Russian.) Use of Manganese in Scrap Iron Process. E. D. Akol'tsev and V. B. Kaplun. *Metallurg,* v. 3, Mar. 1958, p. 11-13.

(D2a; ST, *Mn,* RM-p)

258-D. (Russian.) Deoxidation of Low-Alloy Steels. I. M. Leikin. *Metallurg,* v. 3, Mar. 1958, p. 13-16.

By increasing the proportion of Mn in relation to Si and by lessening the Al content, the oxide inclusions in steel diminish. (D11r; AY, *Al, Mn*)

259-D. (Russian.) New Arrangement for Pouring Liquid Steel Through a Vacuum. G. A. Sokolov and G. N. Oiks. *Metallurg,* v. 3, Mar. 1958, p. 16-21.

Pouring steel from induction furnace into evacuated ladle accelerates removal of gases from melt. (D9m, D9p, D9s, 1-73; ST)

260-D.* Electric Smelting of Iron Ore. K. Sandvold, F. C. Collin and J. Gundessen. *Iron and Coal Trades Review,* v. 176, May 9, 1958, p. 1099-1101.

Smelting in 70,000-kw. electric furnace with the purpose of utilizing electric power with poor grades of fuel. The charge consists of lumps of ore (either high or low-grade) and the carbonaceous reducing agent. Best results are obtained by using sintered magnetite with crushed limestone in Tysland-Hole furnace. (D8n, W17j)

261-D. New Methods of Ironmaking. Effect of Coke and Scrap Shortage. Hermann Schenck. *Iron and Coal Trades Review,* v. 175, Dec. 13, 1957, p. 1363-1364. (From technical supplement of *Handelsblatt,* Oct. 25, 1957.)

(D1a, D2a, D8p, D8j; RM-p, RM-j43)

262-D. Smelting of Basic Pig Iron Using Oxygen-Enriched Blast. I. P. Bardin. *Stal',* Aug. 1957, p. 673-684. (Iron and Steel Institute Translation no. 694.)

Previously abstracted from original. See item 60-D, 1958. (D1h; CI-a)

263-D. Determination of the Variables Affecting the Yield of Rimming-Type Free-Cutting Steel. Leo Heinen and Alfred Latour. *Stahl und Eisen,* v. 77, Sept. 5, 1957, p. 1204-1209. (Iron and Steel Institute Translation no. 696.)

Previously abstracted from original. See item 22-D, 1958. (D9p, 2-60; ST-d, *Mn, S*)

264-D. Operation of a Blast Furnace With a Top Gas Pressure of Up to 1.1 Atmospheres. V. P. Onoprienko and B. N. Starshinov. *Stal',* Sept. 1957, p. 772-778. (Iron and Steel Institute Translation no. 718.)

Previously abstracted from original. See item 61-D, 1958. (D1h)

265-D. Investigations on Converter Smoke With a View to Spectroscopic Control of the Basic Bessemer Process. Franz Wever. *Stahl und Eisen,* v. 77, Oct. 17, 1957, p. 1451-1459. (Iron and Steel Institute Translation no. 772.)

Previously abstracted from original. See item 24-D, 1958. (D3, S11k)

266-D. Behavior of Hydrogen in the Blowing of Steel in the Oxygen-Steam Converter Process. Herbert Neuhaus. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1863-1867. (Iron and Steel Institute Translation no. 810.)

Previously abstracted from original. See item 91-D, 1958. (D3, S11r; ST, *H*)

267-D. Desulphurization in the Basic Openhearth Process. Karl-Georg Speith. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 27-34. (Iron and Steel Institute Translation no. 823.)

Previously abstracted from original. See item 92-D, 1958. (D2d, D10n; ST, *S*)

268-D. Soviet Blast-Furnace Production. I. A. Nekrasov. *Stal',* Nov. 1957, p. 965-968. (Iron and Steel Institute Translation no. 833.)

Previously abstracted from original. See item 78-D, 1958. (D1, A4p; ST)

269-D. The (Basic) Hot-Blast Cupola, Openhearth Steel Plant and the L. D. Crucible Combined in One Unit. Adolf Richter, Georg Cohen and Paul Jacobi. *Stahl und Eisen,* v. 78, Mar. 6, 1958, p. 273-284. (Iron and Steel Institute Translation no. 901.)

Previously abstracted from original. See item 145-D, 1958. (D2, D10a, 1-65; ST)

270-D. The Decarburizing Reaction in the Basic Steel Converter During Dephosphorization. Heinz Pottgiesser. *Stahl und Eisen,* v. 78, Mar. 6, 1958, p. 291-298. (Iron and Steel Institute Translation no. 903.)

Previously abstracted from original. See item 146-P, 1958. (D3, 1-65; ST)

271-D. Effect of Electric Inductive Agitation of the Bath on the Metallurgical Reactions in the Electric Arc Furnace. Karl-Georg Speith, Hans vom Ende and Wolfgang Schneider-Milo. *Stahl und Eisen,* v. 78, Feb. 20, 1958, p. 215-220. (Iron and Steel Institute Translation no. 906.)

Previously abstracted from original. See item 144-D, 1958. (D5f)

272-D.* (German.) **Investigations on the Formation of Inclusions During Deoxidation With Silicon.** Wilhelm Anton Fischer and Manfred Wahlster. *Archiv für das Eisenhüttenwesen,* v. 29, 1958, p. 1-9.

Steel was melted in high-frequency furnaces. Specimens taken before and after silicon addition were investigated metallographically and the nonmetallic inclusions were separated electrochemically. Immediately after silicon addition primary inclusions high in SiO_2 were observed, which corresponded to the immiscibility gap in the system FeO-SiO_2. 9 ref. (D11r, D5; ST, 9-69, *Si*)

273-D.* (German.) **The Rotor Process.** Edgar Spetzler. *Neue Hutte,* v. 3, Feb. 1958, p. 85-93.

Oxygen is blown into a slowly rotating drum which is filled with pig iron, limestone and iron ore. Phosphorus content reduced to 0.02%; sulphur, nitrogen and oxide contents also low. (D10c)

274-D. (Russian.) **Physical Chemical Basis of Steel Production.** B. V. Lunchevskii. *Academy of Sciences of the USSR, Journal,* v. 9, 1957, p. 119-121.

(D11)

275-D. (Russian.) **Desulphurization of Pig Iron.** M. I. Gromov, L. M. Tsylev, A. M. Kakunin, V. I. Kotov and V. N. Kaporulin. *Metallurg,* v. 3, Mar. 1958, p. 3-6.

Use of electrolysis in vacuum and electromagnetic mixing of melt. (D8m, D11s; CI-a)

276-D.* (Russian.) **Use of Iron Ore Briquettes in Reduction of High-Phosphorous Iron in Openhearth.** M. T. Bul'skii, F. F. Sviridenko and N. T. Berilov. *Stal',* v. 18, Apr. 1958, p. 303-306.

Replacement of deficient openhearth lump iron ores with briquettes of pulverized iron-rich ores or iron ores mixed with limestone, accelerates the process of desulphurization and reduces the tap-to-tap time (provided that the briquettes charged into the furnace are intensively heated). (D2a, B16d, Fe)

277-D. (Russian.) **Use of Highly Basic Sinter in Melting Phosphorous Iron in Openhearth.** I. V. Raspopov, Ya. S. Gorbanev and F. F. Sviridenko. *Stal',* v. 18, Apr. 1958, p. 306-311.

Reduces melting time, increases productivity of furnace, improves quality of slag as fertilizer and cuts down consumption of high-grade ores. 4 ref. (D2a)

278-D. (Russian.) **Gas Heating of Ingot Heads.** K. N. Konovalov, N. K. Korneva, M. P. Danilov, L. I. Teder, T. T. Drobyazko. and A. S. Shtepa. *Stal',* v. 18, Apr. 1958, p. 311-316.

Use of specially designed burner for gas heating of ingot heads increased output of acceptable billets by 5-7% as a result of reduction of head crops. 7 ref. (D9, 1-52)

279-D. (Russian.) **Effectiveness of Various Methods of Heating Ingot Heads.** *Stal',* v. 18, Apr. 1958, p. 319-323.

(D9)

280-D. Production of Self-Fluxing Sinter. J. S. McMahan. *Blast Furnace and Steel Plant,* v. 46, May 1958, p. 497-498.

Operating characteristics and production of blast furnace with burden consisting of calcite or dolomite sinter. (Concluded.) (D1a, D1b; RM-n)

281-D. Rotary Kiln Enters Iron-Ore-Reduction Race. C. S. Cronan. *Chemical Engineering,* v. 65, May 5, 1958, p. 52-54.

R-N kiln reduces ore having at least 25% iron to metal. New-type control holds reducing gases at uniform heat. Shell inlet parts feed air into kiln to burn gases as they flow through. (D10c, Fe)

282-D. Openhearth Operation With High Firing Rates. Keith Moore. *Industrial Heating,* v. 25, May 1958, p. 968, 970, 972.

(D2h)

283-D. Bottom Practice at No. 1 Openhearth. R. M. Jordan. *Industrial Heating,* v. 25, May 1958, p. 1005-1006, 1008, 1010, 1012, 1014.

The flat at a tap hole is the area of greatest bottom trouble incidence. (D7, 1-52)

284-D. Use of Sinter in the Blast Furnaces of the USSR. G. J. Adariukov. *Iron and Coal Trades Review,* v. 176, Apr. 18, 1958, p. 931-932. (D1a)

285-D. Twenty Years of Steelmaking. R. C. Baker. *Iron and Steel,* v. 31, May 1958, p. 186-192.

Experiences, operational problems, layout, control and practice in British openhearth plant. (D2, W18r, 18-67)

286-D.* Oxygen and the Steel Plant: Summary of Operating Results. J. H. Strassburger. *Iron and Steel Engineer,* v. 35, May 1958, p. 69-71.

Growth of oxygen usage in steel plants in past decade; approximate quantities of oxygen used in openhearths, bessemer converters, top-blown oxygen converters, hot scarfing machines and blast furnaces per unit of production. Oxygen enrichment of blast, high blast heat, increased moisture in blast and improved burden have resulted in increased productivity of National Steel Corp.'s blast furnaces. Minimum of maintenance has been required for oxygen-producing equipment in company's plants. (D-general; ST, *O*)

287-D.* Oxygen and the Steel Plant: Benefits of Purchased O_2 to the Indiana Harbor Works of the Inland Steel Co. N. R. Kirkdoffer. *Iron and Steel Engineer,* v. 35, May 1958, p. 71-76.

History of oxygen usage at Indiana Harbor Works; oxygen facilities; reasons for selection of pipeline method of supply. Use of oxygen has enabled Inland to improve product quality, increase productivity of openhearth furnaces and reduce manhour requirements for surface conditioning, scrap preparation and maintenance activities. (D2g; ST, *O*)

288-D.* Oxygen and the Steel Plant: Economics of Generated Vs. Purchased O_2 for Steel Plant Use. R. A. Lambert. *Iron and Steel Engineer,* v. 35, May 1958, p. 76-81.

Oxygen (100% high-purity) for normal plant uses is generated on site at Pittsburgh Works of Jones & Laughlin Steel Corp. Description of plant, storage facilities, distribution system; consumption in various departments; operating costs. (D-general, W10; ST, *O*)

289-D.* Oxygen and the Steel Plant: Operation and Maintenance of a 100-Ton Double-Cycle Gaseous O_2 Plant. G. T. Wright. *Iron and Steel Engineer,* v. 35, May 1958, p. 81-84.

In 1954, Dominion Foundries & Steel, Ltd., in Hamilton, Canada, installed first oxygen steelmaking equipment on North American Continent. Two oxygen plants, one of which is described here, supply oxygen for steel melt shop and miscellaneous uses. (D10, W10; ST)

290-D.* Oxygen and the Steel Plant: Oxygen Plant Cycles Tailored to Requirements of Iron and Steel Producers. Clarence J. Schilling. *Iron and Steel Engineer,* v. 35, May 1958, p. 86-94.

Low, medium, high and mixed-pressure cycles for on-site generation of liquid or gaseous oxygen and nitrogen by-product. (D-general, B25, 1-52; ST)

291-D. Designing a Large Tonnage Continuous Casting Plant. H. E. Skelley and Rufus Easton. *Iron and Steel Engineer,* v. 35, May 1958, p. 131-142.

11 ref. (D9q, 2-52, W10; ST)

292-D. Vacuum Steel Grows Up. J. H. Stoll. *Product Engineering,* v. 29, May 1958, p. 70-71.

Vacuum pouring insures against flakes, reduces nonmetallics and gives higher ductility. The operation may be watched by two television cameras, one focused on the stream of molten metal and the other one looking directly into the mold. (D9p, 1-73, X15p)

293-D. (German.) **Influence of Alumina and Magnesium Oxide on Desulphurization of Pig Iron Melts With Lime-Silica Slag Under Reducing Conditions.** Willy Oelsen, Eberhard Schürmann and Salah Osman. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 205-218.

Mechanism of desulphurization, experimental technique, effect of alumina, influence of magnesium oxide on desulphurization and its effect in the presence of alumina. Effect of addition of both on sulphur content of pig iron and on silicon reduction. Their significance in the determination of the basicity of the slag. (D11n; CI-a, RM-q)

294-D. (German.) **Conditions of Smelting Pure Iron.** Ludwig von Bogdandy, Rudolf Schmolke and Gerhard Winzer. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 231-234.

Investigation on oxygen emission by crucible materials—aluminum, calcium, magnesium, zirconium oxides and dolomite measuring surface stress of molten pure iron in pressed specimens of these materials. Comparison of results with those obtained by thermodynamic calculation. (D11r, P12; Fe-a)

295-D. (Russian.) **More Effective Method for Control of Carbon Content of Iron.** L. I. Slepushova, *Stal',* v. 18, Apr. 1958, p. 298-300.
10 ref. (D2, D11s)

296-D. Survey of Modern Blast-Furnace Techniques. T. P. Colclough. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 113-124.
(D1)

297-D. Continuous Casting at the B.I.S.R.A. Experimental Plant. G. Fenton and J. Pearson. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 160-167.
(D9q)

298-D.* Weather Influences Hydrogen in Steel. T. W. Merrill. *Metal Progress,* v. 73, June 1958, p. 153-154, 158. (From *Vancoram Review,* v. 12, no. 2, Fall 1957, p. 14-15.)

Results of experiments indicate that weather, specifically moisture content of the air, is the most important factor in determining rate of hydrogen absorpion in molten steel. (D11h; ST, *H*)

299-D.* Manufacture of Leaded Steel. W. D. Smith. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 12-22.

Special equipment, close metallurgical control during and after the addition of the lead and careful inspection permit production of a highly satisfactory ingot. 5 ref.
(D2, D8; ST, *Pb*)

300-D. Open Hearth Operation With High Firing Rates. A. K. Moore. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 26-31.

Summary of steps taken to increase furnace capacity from 16,000 to 23,000 tons per month by increasing fuel capacity, forced air capacity and other measures. (D2a)

301-D.* Factors Affecting Heat Time. Thomas A. Cleary, Jr. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 32-38.

Effects of such variables as frequency of checker washing, furnace age and scrap change time on heat time. Equations indicating relationship of heat time to campaign life, and of heat life to time from start of charge to hot metal. (D2)

302-D. Effects of Improved Combustion Conditions in a Small Cold-Metal Shop. Gene M. Hagenberger. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 40-48.

Furnace production increased by increasing air volume, higher furnace pressure and accurate combustion control. Significant decreases in fuel requirements per ton were realized with no decrease in furnace life. (D2a, D2h)

303-D.* European Methods of Acid Steelmaking. P. Herasymenko. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 49-65.

Steel with high manganese content in the charge can be refined without additions of ore and finished without addition of deoxidizers. Theory of hydrogen distribution between slag and metal. Lowering of hydrogen content possible by casting hollow ingots. 16 ref.
(D2, 1-64, D11n)

304-D.* Analysis of Molten-Steel Flow Rates Through Refractory Nozzles. Carter H. Martin and Harold L. Taylor. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 84-97.

Study of ladle nozzle erosion as steel is poured through either magnesite or clay nozzles. Erosion is directly proportional to time; therefore weight-flow rates can be computed as a function of pouring time.
(D9p; RM-h)

305-D. Effect of Banding and Oil Impregnation of Nozzles on Pouring Performance. A. Sontz and R. N. Ames. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 147-157.

Effects of nozzle cracking are minimized by using bands, but no significant improvement results from impregnation with various carbonaceous materials. 8 ref.
(D9p, W18r; RM-h)

306-D. An Evaluation of Cast Refractory Hot-Top Linings. R. J. Tatousek and A. T. Peters. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 158-166.

Although the life of cast linings was greater than that of brick linings, excessive erosion during the extended life of the cast linings caused hot-top metal losses that were prohibitive. A brick-lined hot top, reduced in volume, compared favorably with regular hot tops. (D9k, W19c)

307-D. The All-Basic Furnace. J. E. Harrod. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 167-175.

Report on operation of U. S. Steel furnace from 1947 to 1956. (D2, W18r; 1-65)

308-D. Quality Considerations in Cold-Metal Charging. Russell H. Farr. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 208-216.

(D2a, 17-4)

309-D. Alloy Steel Production in a Cold-Metal Shop. A. H. Stewart. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 216-219.

(D2; AY-b, SS-b)

310-D. New Trends in Firing Practices for Open Hearth Furnaces. J. E. Goodin. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 236-241.

High-pressure gas as an atomizing agent can be used efficiently to replace steam. The current prices of natural gas and fuel oil also make a high-pressure gas for atomization economically attractive. (D2h, W18r)

311-D. Contribution of Bath Temperature Control to Improved Open Hearth Production Rates. W. J. Flynn. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 245-252.

(D2, S16a)

312-D. Influence of Open Hearth Combustion Practice on Rates of Heat Transfer as Determined by Use of the Hot-Model Technique. J. H. Richards. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 253-266.

(D2h, P11k, 17-56)

313-D. Design and Operation of Open Hearth Furnaces in Australia in 1957. R. L. Knight. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 266-280.

(D2, W18r)

314-D. The Physical Chemistry of Steelmaking—a Tribute to Dr. C. H. Herty, Jr. G. R. Fitterer. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 281-303.

Historical review. 40 ref. (D11, A2)

315-D. Current Concepts of Open Hearth Slag Control. M. W. Lightner. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 304-314.

20 ref. (D2d)

316-D. Research - Foundation of Steel's Progress Today. James B. Austin. *Franklin Institute, Journal,* v. 265, May 1958, p. 385-394.

First William B. Coleman lecture delivered at the Annual Meeting of the Franklin Institute, Jan. 15, 1958. (D-general, A9; ST)

317-D. U. S. Steel Puts Oxygen Analyzer Into Closed-Loop Combustion Control. E. W. Hunziker and J. W. Bain. *I.S.A. Journal,* v. 5, May 1958, p. 32-36.

In the Geneva Works openhearth department, Provo, Utah. (D2h, S11r, 1-53)

318-D. Instrumentation for Iron and Steel. *Metal Treatment and Drop Forging,* v. 25, May 1958, p. 181-186.

Openhearth furnace control, bessemer instrumentation, strip measurement and inspection; future developments. (D-general, S18; ST)

319-D. Refractories for the New Steelmaking Processes. J. H. Chesters. *Refractories Journal,* no. 4, Apr. 1958, p. 145-167, 170, 174.

Challenge presented by the new oxygen techniques. 27 ref. (D-general, D10, RM-h)

320-D. Europe Expands Steel-Making Capacity. D. L. McBride. *SAE Journal,* v. 66, June 1958, p. 62-63.

Review of significant European developments including the Kaldo process, the Oberhausen rotary furnace and direct reduction methods. (D10, D8j, D8n; ST)

321-D.* (Russian.) **Problem of Sulphide Inclusions in Molten Steels.** D. K. Butakov. *Fizika Metallov i Metallovedenie,* v. 5 no. 1, 1957, p. 155-160.

Development of sulphides is connected with the process of solidification. This may be observed by Bauman's test which produces impression of dendritic crystals. In nonmanganese steels sulphides crystallize at 988° C. In Mn and other alloy steels inclusions develop at higher temperatures depending on

sulphur content and on its correlation with Fe, Mn, Al and Si which may enter into their composition. 14 ref. (D11s, N12; ST, 9-69)

322-D.* (Russian.) **Blowing of Reducing Gases Into Blast Furnace Hearth.** M. A. Shapovalov, *Stal',* v. 18, May 1958, p. 385-390.

Factors influencing coke consumption; efficiency of natural gas and coke-oven gas; optimal point of application of gas blast; suitable composition of gas; calculation of thermal balance and carbon consumption; economics of reducing gas blast. 7 ref. (D1h, D11g, D11k)

323-D.* (Russian.) **Higher Efficiency of Blast Furnace Reached by Changing Blast Composition.** E. M. Lokshin and Yu. S. Borisov. *Stal',* v. 18, May 1958, p. 391-397.

Effect of various factors on efficiency of blast furnace; calculation of raw materials; calculation of zonal thermal balances; calculation of burning process in tuyere zone; calculation of direct reduction; determination of smelting indices; various types of combined blast. 9 ref. (D1h, D11k)

324-D.* (Russian.) **Dependence of Coke Consumption and Productivity of Blast Furnace Upon Sinter Basicity.** I. B. Strashnikov, A. G. Astakhov, G. V. Ksendzyk, I. V. Fedorovsky and K. A. Shumilov. *Stal',* v. 18, May 1958, p. 398-402.

Dependence of coke consumption, ratio of ore to coke and smelting intensity upon sinter basicity. Factors interfering with smelting intensity. Method of evaluating sinter quality. (D1, D11)

325-D.* (Russian.) **Gas Absorption by Bessemer Steel Melted With Oxygen Blast.** S. G. Afanasyev and M. M. Shumov. *Stal',* v. 18, May 1958, p. 405-410.

Mechanism of nitrogen absorption. Factors influencing nitrogen content of steel. Oxygen equilibrium in bessemer process. Production of high-quality bessemer steel by bottom-blown and top-blown methods. 5 ref. (D3f, D11h)

326-D.* **Vacuum Pouring of Ingots for Heavy Forgings.** J. H. Stoll. *Blast Furnace and Steel Plant,* v. 46, June 1958, p. 595-605.

Vacuum pouring cuts down on hydrogen content and prevents flaking. One 7-ton and two 250-ton vacuum degassing units, composed of a mold within a sealed chamber, were tested. Hydrogen content averaged 0.5 ppm. against 1.5 ppm. in air-cast material. Ductility and cleanliness were superior. Initial and operating costs are higher and hazards greater. (D8m, D9s; ST)

327-D. **Ironmaking—Art or Science?** Harold A. Goldfein. *Blast Furnace and Steel Plant,* v. 46, June 1958, p. 611-614.

Operation of blast furnaces; quality of coke and limestone; handling of ore from unloading to furnace; temperature, humidity, pressure in operation of furnace; quality of slag. (D1)

328-D. **Continuous Casting of Steel.** *Engineering,* v. 185, Mar. 7, 1958, p. 293-294.

German practice at Demag, A.G., Duisburg. (D9q; ST)

329-D. **Reaction Between Silica and Carbon and the Activity of Silica in Slag Solution.** J. D. Baird and J. Taylor. *Faraday Society, Transactions,* v. 54, Apr. 1958, p. 526-539.

21 ref. (D11; Si, C, RM-q)

330-D. **Increasing Blast-Furnace Smelting Rates.** R. Sewell. *Iron and Coal Trades Review,* v. 175, Nov. 8, 1957, p. 1075-1077. (From *Metallurg,* Aug. 1957.)

(D1)

331-D. **The 49th BISRA Steelmaking Conference.** *Iron and Coal Trades Review,* v. 176, Mar. 7, 1958, p. 561-567.

Held by the British Iron and Steel Research Association, at Harrogate, Nov. 6-7, 1957. Discussions cover the use of oxygen. (D10, D2g, D3f)

332-D. **The Study of Slag-Metal Mixing Efficiency by Models.** C. E. A. Shanahan and F. Cooke. *Journal of Applied Chemistry,* v. 7, Dec. 1957, p. 645-654.

Relative efficiencies of various methods of mixing liquid slag and metal studied by means of cold models. Using sodium amalgam as "metal" and dilute sulphuric acid as "slag" it is shown that a most efficient method of mixing consists of pouring the metal into the slag and that the degree of mixing is depepdent on both the drop height and the rate of pouring. 7 ref. (D11n)

333-D. **Oxygen in Steelmaking.** J. A. Charles. *Research Applied in Industry,* v. 9, Mar. 1958, p. 102-107.

Main oxygen applications within the industry and progress achieved; a period of concentrated attention to the design of special furnaces and equipment predicted. (D10, D2g, D3f)

334-D. Successful Culmination of British Experimentation in Continuous Casting of Steel. *Wire Production*, v. 6, Dec. 1957, p. 14-15.

British production at the Low Moor Alloy Steelworks Ltd. and at the Barrow Steel Co. (D9q)

335-D. (Greek.) **Electric Smelting of Iron Ore.** K. Sandvold, F. S. Collin and J. Gundersen. *Xnyika Kpovika*, v. 23, Feb-Mar. 1958, p. 46-50.

Development of iron smelting in electrical furnaces in Norway and elsewhere. 7 ref. (D8n; Fe)

336-D. (Rumanian.) **Desulphurizing Power of Blast Furnace Slags. Pt. 7. Sulphur Absorption Capacity of Slags of the System SiO_2-CaO-BaO in the Liquid State at 1500° C.** Traian T. Negrescu. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 447-463. 6 ref. (D11n; *S*)

337-D. (Russian.) **Technical and Economic Advantages of Using Steam-Air in Blast Furnaces.** V. Ya. Miller and S. A. Elkin. *Stal'*, v. 18, Mar. 1958, p. 193-202.

Quantitative relations between the moisture content of the blast and the reducing power of the blast gases established by new method for investigating the diffusion reduction rate of iron oxides. This made it possible to determine the minimum rise of the blast temperature on which the technical and economical advantages of using steam air blast in blast furnaces depends. 4 ref. (D1h, D11r)

338-D. (Russian.) **Production of Steel From Low-Manganese Pig Iron.** P. G. Glazkov, A. M. Ofengenden, I. I. Druzhinin, R. P. Nesterovich and G. T. Chepurnoi. *Stal'*, v. 18, Mar. 1958, p. 209-213.

Production of steel from pig iron of acceptable sulphur content is possible under the conditions prevailing in the southern part of the USSR. Efficiency may be improved by using coke oven gases, freed from sulphur for firing openhearth furnaces. 9 ref. (D2; D11s; RM-m38)

339-D. (Russian.) **Deoxidation of Killed Steel in the Ladle by Ferro-Aluminum.** I. N. Ladyanov. *Stal'*, v. 18, Mar. 1958, p. 218-223.

Use of ferro-aluminum alloy addition instead of adding Al to the metal during tapping results in a saving in Al and improvement in steel quality. 6 ref. (D9r; Fe, *Al*, AD-n)

340-D. (Russian.) **Temperature of the Combustion Products at the Outlet of a Tilting Open-Hearth Furnace.** G. M. Glinkov, E. A. Kapustin and V. A. Makovsky. *Stal'*, v. 18, Mar. 1958, p. 223-224. (D2h)

341-D. (Russian.) **Production of Transformer Steel by Mixing Openhearth and Electric Steels.** G. Vozny. *Stal'*, v. 18, Mar. 1958, p. 225-226. 5 ref. (D7a; ST, SGA-n, *Si*)

342-D.* (Russian.) **Desulphurization of Steel in the Ladle.** A. S. Tochinsky and N. V. Popova. *Stal'*, v. 18, Mar. 1958, p. 214-218.

Sulphur content of steel may be reduced by 35-45% without substantial rise in the price of the metal and with certain improvement in quality by treating the acid or basic metal with white or alumina-containing slags in the ladle during tapping. (Dgm, D11n; ST, *g*)

343-D. (Book.) **Proceedings of the 40th Conference: National Openhearth Steel Committee of the Iron and Steel Division.** 340 p. v. 40, 1958. The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, 29 W. 39th St., New York 18, N. Y.

The 1957 convention papers, covering basic and acid operations, operating metallurgy, refractories and masonry, cold metal and basic foundry practice, operating and combustion and physical chemistry. Papers separately abstracted. (D-general)

344-D. Refining High-Phosphorus Pig-Iron With Oxygen. Heinrich Rellermeyer, Helmut Knuppel and Johann Sittard. *Iron and Coal Trades Review*, v. 176, p. 1039-1043. (From *Stahl und Eisen*, Sept. 19, 1957.)

Previously abstracted from original. See item 345-D, 1957. (D10a; ST)

345-D. Thermodynamics of the Reaction of Dephosphorization of Iron. I. Yu. Koshevnikov and L. A. Shvartsman. *Academy of Sciences of the USSR, Proceedings*, v. 113, 1957, p. 185-188. (Translation by Consultants Bureau, Inc.)

8 ref. (D11n; Fe)

346-D. Development of Deoxidation Process of Rimming Steel. A. A. Bezdeneshnykh. *Stal'*, v. 17, Aug. 1957, p. 701-707. (Iron and Steel Institute Translation no. 703.)

Previously abstracted from original. See item 42-D, 1958.
(D9r; ST-d, *Mn*, AD-n)

347-D. Sulphur Exchange Between Gas Phase and Bath of a Basic Openhearth Furnace. S. N. Stupar. *Stal'*, v. 17, Aug. 1957, p. 707-712. (Iron and Steel Institute Translation no. 705.)

Previously abstracted from original. See item 43-D, 1958.
(D11h, D2; ST)

348-D. Influence of Deoxidation With Aluminum on the Quality of Structural Steel. N. G. Antropova. *Stal'*, v. 17, Jan. 1957, p. 64-69. (Iron and Steel Institute Translation no. 743.)

Previously abstracted from original. See item 333-D, 1957.
(D11r; ST, *Al*, AD-r)

349-D. Desulphurization in the Basic Steel Converter. Karl Georg Speith. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 152-156. (Iron and Steel Institute Translation no. 876.)

Previously abstracted from original. See item 124-D, 1958.
(D3, D11n; AY)

350-D. Effect of Electro-Inductive Agitation of the Bath on the Metallurgical Reactions in the Electric Arc Furnace. Karl Georg Speith. *Stahl und Eisen*, v. 78, Feb. 20, 1958, p. 215-220. (Iron and Steel Institute Translation no. 906.)

Previously abstracted from original. See item 144-D, 1958. (D5f)

351-D. Automatic Control of Gas Distribution in the Blast Furnace Shaft. I. A. Suchkov and V. V. Burtsev. *Stal'*, Feb. 1958, p. 110-113. (Iron and Steel Institute Translation no. 963.)

Previously abstracted from original. See item 205-D, 1958.
(D1f, 18-74)

352-D.* (Russian.) **Investigation of Sinter Formed During Oxidation of Iron in Carbon Dioxide Gas.** V. I. Arkharov. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 251-254.

X-ray study of oxidation of iron in CO_2. The first stage of the reaction is limited by the speed of oxygen supplied to area of reaction. This results in formation of layer of FeO. In subsequent phase, the process is limited by the continuously slowing supply of iron to area of the reaction. This results in formation of an outer layer of Fe_3O_4 (on top of layer FeO). The further structural picture of oxidation in CO_2 is similar to that in steam. The differences in flow between these two stages can be explained by differences in adsorption and desorption of the gaseous components. 6 ref. (D1, R1h; Fe)

353-D.* **Desulfurization of Iron and Steel.** S. L. Gertsman. *Foundry*, v. 86, Aug. 1958, p. 48-53.

More than 85 heats of acid and basic electric and basic induction steel have been desulphurized by lancing with a carrier gas. Reductions of up to 40% of the steel's original sulphur content can be obtained by lancing basic induction and acid electric steel in the ladle. This operation takes about 2 min. for a 500-lb. melt and is accompanied by a considerable drop in temperature (75 to 150° F.). (D11s)

354-D.* **Automatic Charging Control for No. 3 Fairless Blast Furnace.** S. P. Curtis, R. F. Schramm and D. W. Fath. *Iron and Steel Engineer*, v. 35, July 1958, p. 73-84.

Charging control for new furnace represents combined knowledge and efforts of operators, furnace builders and control engineers; permits greater flexibility in choosing charging cycles, provides more information to operators and maintenance personnel. (D1a, W17g)

355-D.* (French.) **Analysis of Some Recent Studies of Refractories Used in Steelmaking.** G. Vie. *Industrie Ceramique* no. 497, May 1958, p. 161-165.

Properties of different types of refractory bricks; effect of type of refractory on furnce operation and product quality; life of linings. 14 ref. (D-general; RM-h)

356-D.* (Italian.) **Manufacture of Steel for Castings in the Electric Arc Furnace. Pt. 2.** Giuseppe Violi. *Fonderia*, v. 7, Apr. 1958, p. 118-128.

Composition of charges; metallurgical control; steel-scrap process; coal-scrap process; basic and acid processes and advantages of each. 26 ref. (D5)

357-D.* **Continuous Casting Plant.** *Indian and Eastern Engineer*, v. 122, Apr. 1958, p. 279, 281.

Eight-strand continuous casting machine being built by Demag A-G

for Terni Societa per l'Industria e l'Electricita. (D9q, W19f)

358-D. Designing for Aluminum Permanent Mold Casting. Pt. 3. Tolerances. *Precision Metal Molding,* v. 16, June 1958, p. 28-29, 50.

(D-general, E15, S22)

359-D. Reaction of Iron Ores With Methane in a Fluidized Bed. K. P. Lavrovsky, A. L. Rozental and A. Kh. Eglit. *Academy of Sciences of the USSR, Proceedings,* v. 112, 113, 114, 1957, p. 9-12. (Translation by Consultants Bureau, Inc.)

(D11g; RM-n)

360-D. The Melting of Transformer Steel. Kurt Fellcht and H. Kutscher. *Neue Hütte,* v. 2, Sept. 1957, p. 525-537. (Iron and Steel Institute, Translation no. 948.)

Previously abstracted from original. See item 8-D, 1958.
(D-general, 2-60; SGA-r, AY)

361-D.* (Swedish.) **Some Experiences of Sponge Iron Production in Wiberg-Soderfors Furnaces.** H. Kihlander. *Jernkontorets Annaler,* v. 142, no. 3, 1958, p. 93-104.

Sponge iron furnace operating experience; furnaces found reliable with annual capacity of 30,000 tons sintered pellets suitable as raw material. Coke used as fuel. L.P. gas added to reduction gas increased production and lowered consumption of coke and electrical energy. 9 ref. (D8j)

362-D.* (Russian.) **Improvement in the Quality of the Mixture for Self-Sintering Electrodes.** V. V. Rukavishnikov, *Stal',* v. 18, Mar. 1958, p. 281-285.

To overcome uneven performance of electrodes in ferro-alloy electric arc furnaces, the mix from which the electrode is formed should contain no more than 10% cinder, the discharge of volatile elements should range between 14 to 18% and the ingredients should be uniformly mixed and all foreign substances carefully excluded.
(D5, W18s, T1f, 17-57)

363-D. New Way of Producing Carbon-Free Ferrochromium. I. D. Kirichenko. *Stal',* v. 18, no. 2, 1958, p. 131-137. (Henry Brutcher, Altadena, Calif., Translation no. 4193.)

Development of an economical process for removing carbon from solid high, medium or low-carbon ferrochromiums in vacuum with rich iron ore, nickelous oxide, ferrochromium previously oxidized, etc., making it possible to produce carbon-free ferrochromium with 0.01-0.03% carbon and low silicon content. Thermodynamic analysis of process, claimed to prove that American data on the decarburizing reaction involved are incorrect and that silicon is *not* the best deoxidizer. Confirmation of calculations and deductions by actual experiments. Laboratory furnaces used for study of kinetics of process and determination of its end. Results obtained. Pilot vacuum furnace for production trials. How grinding of the new carbon-free ferrochromium can be facilitated and how the quality of 18-8 steel can be improved by its use.
(D8, 1-73, D11r; Fe, Cr, AD-n)

364-D. Swelling of Magnetite Pellets and Briquets During Reduction. G. V. Gubin. *Izvestiya Akademii Nauk SSSR,* Dec. 1957, p. 76-77. (Henry Brutcher, Altadena, Calif., Translation no. 4199.)

Swelling of iron ore plus carbon pellets and briquets, accompanied by a loss of mechanical strength, during reduction in blast furnace. Experimental arrangement and procedure. Role played by carbon monoxide; effect of reduction temperature. Causes of swelling or contraction of various ores and concentrates.
(D1a, D11g; RM-n, Fe, 6-67, 6-73)

365-D. Influence of Vacuum Melting on Properties of Various Materials. W. F. Moore. *Foundry Trade Journal,* v. 104, June 1958, p. 741-745.

Properties of vacuum-induction melted materials can be classified into those which can be classified by conventional methods as well as by vacuum-melting methods, and those which must be vacuum melted because of composition. Latter reveal definite improvements in mechanical and electrical properties and in corrosion resistance. 4 ref. (D8m, C5; 1-73)

366-D.* (French.) **Study of Blast Furnace Phenomena.** B. Menuet-Guilbaud. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 133, June 1957, 23 p. (Reprint from *Revue de Metallurgie,* v. 54, Mar. 1957.)

Apparatus for sampling gas at tuyere level; method of evaluating results; eight typical samplings. 11 ref. (D1, S12h)

367-D.* (German.) **Activity of Manganese in Liquid Iron-Manganese-Carbon Solutions.** Hermann Schenck and Franz Neumann. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 263-267.

The distribution equilibria of Mn between Fe and Ag and the influence of carbon upon the activity of Mn. Conditions for the formation of manganese carbide and the influence of Mn on the saturation limits of Fe with respect to C. Diagrams for the activity of Mn in relation to concentration in temperature ranges between 1450 and 1600° C. Limits in the various phase diagrams determined and verified. 17 ref. (D11m, P12b; Fe, Mn, Ag)

368-D.* (German.) **Performance of Low-Shaft Blast Furnaces at VEB West Works at Calbe and Experiments for Output Increase Through Increase of Blast Volume.** Kurt Sauberlich and Hans-Joachim Lux. *Archiv für das Eisenhüttenwesen,* v. 8, May 1958, p. 294-300.

On a battery of various size low-shaft furnaces the relative output was compared over a period of several months. Among other characteristics the amount of blast and the inlet surface influence the performance considerably. Modifications on some furnaces, which consisted mainly of opening up blast entrance posts and increasing blast volume, resulted in 23% higher output without increasing coke consumption. Tables for operating data, raw material, slag analysis and composition of charges. (D8p; CI-a)

369-D. (German.) **Application of Oxygen-Enriched Air Blast in the Production of Spiegeleisen in the Low-Shaft Furnace.** Helmut Grohmann. *Bergakademie,* Dec. 1957, p. 632.

(D8p, W17h)

370-D.* (German.) **Application of Oxygen for the Production of Pig Iron in Low-Shaft Blast Furnaces.** Kurt Sauberlich, Helmut Grohmann and Gerhard Richter. *Neue Hütte,* v. 3, Apr. 1958, p. 225-232.

Extensive operating tests to determine the feasibility of adding up to 35% oxygen to the blast. Theoretical fundamentals of oxygen blast. Tests run in a big low-shaft furnace with 25% oxygen proved to give 26% higher yield, reducing coke consumption by 6.1%. 12 ref. (D8p; CI-a)

371-D. (German.) **Reconstruction and First Results of Operation of Krupp-Renn Plant at Salzgitter-Watenstedt.** Dietrich Fastje. *Stahl und Eisen,* v. 78, June 12, 1958, p. 784-792.

Reasons for reconstruction; future development of direct reduction and possible use of drum-type furnace for reduction of iron ores. (D8j, 1-55; Fe)

372-D. (German.) **Dust Produced During Blowing in Converter as Indicator of Refining When Using Oxygen-Enriched Air.** Ludwig von Bogdandy and Heinz-Dieter Pantke. *Stahl und Eisen,* v. 78, June 12, 1958, p. 792-798.

Metallurgical reactions during last 2 min. of blowing; quantity, grain size, composition of dust from transition point to termination of blowing; vaporization in the converter; measuring quantities of discharged dust for control purposes; use of extinction method for determination of final point. 22 ref. (D3b, D11g, S18s; ST)

373-D. (German.) **Optical Measurement of Temperature in Converter Refinement of Steel.** Paul Höller and Hans Smit. *Stahl und Eisen,* v. 78, June 12, 1958, p. 799-804.

7 ref. (D3f, S16a; ST)

374-D.* (Italian.) **Manufacture of Steel for Castings in the Electric Arc Furnace. Pt. 1.** Giuseppe Violi. *Fonderia Italiana,* v. 7, Feb. 1958, p. 43-52.

Equipment and operational requirements for mills making steels for castings; development of electric steelmaking and recent improvements in arc furnaces; basic and acid processes and advantages of each; preponderance of acid in U. S., basic in Europe. (D5, W17s; ST)

375-D.* **Pre-Treatment of Molten Iron.** L. Cook. *Iron and Coal Trades Review,* v. 177, July 11, 1958, p. 87-93.

Use of the oxygen lance and simultaneous injection of powdered lime, limestone, mill-scale, fluorspar and bauxite, in various combinations, can be an effective means of desiliconization or dephosphorization of molten phosphoric pig-iron. (D11n, D1h; Fe)

376-D. **Refining Grain Structure by Inoculation.** *General Electric Review,* July 1958, p. 26-27.

Function of inoculants, mechanism of ingot solidification at liquid-solid interface. (D9r; SS)

377-D. **Open Hearth Fuel Atomization With a Reaction-Type Jet Burner.** G. W. Hinds and A. L. Hodge. *Industrial Heating,* v. 25, July 1958, p. 1380-1384.

Increased production of open-hearth steel through higher firing rates necessitates the use of an inherently high-temperature combustion system. Atomization of liquid fuel by a gas jet flame. (D2h, W18r)

378-D. Oxygen/Steam Mixed Blast in the Basic Converters at Esperance-Longjoz—Past, Present and Future Development. Jean Daubersv. *Iron and Coal Trades Review,* v. 176, June 13, 1958, p. 1439-1441.

(D3, 1-65; ST)

379-D. Direct Reduction Processes for Iron Ore. P. E. Cavanagh. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 78-86.

Processes in commercial use and those under development, especially the Ontario Research Foundation direct steel process, and jet smelting. (D8; RM-n, Fe)

380-D. Survey of Modern Blast-Furnace Techniques. T. P. Colclough. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 87-95.

7 ref. (D1)

381-D. Use of Oxygen, Moisture and High Top Pressure in Blast-Furnace Operation. J. M. Strassburger. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 105-120.

5 ref. (D1h)

382-D. (French.) **Preparation of Blast-Furnace Charges in France.** J. Astier. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 125-132.

(D1a, RM-n, Fe)

383-D. Experience With Sinter Burden in Swedish Blast-Furnaces. Ulf Notini. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 133-138.

Study of use of self-fluxing sinter. Results in reduced coke consumption, increased output, more consistent pig iron. (D1a; Fe)

384-D. A Programme-Controlled Reduction Test for Blast-Furnace Burdens. Rolf Linder. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 139-149.

Attempt to correlate behavior of ore in the laboratory with behavior in the blast furnace, based on degree of oxidation of ore at 1000°. (D1; RM-n, Fe)

385-D. (French.) **Chronicle of Steelmaking. The Competitive Position of the Martin Furnace.** G. Grenier. *Echo des Mines et de la Metallurgie,* no. 3515, Apr. 1958, p. 231-233.

(To be continued.) 8 ref. (D2, A4q)

386-D. (French.) **Experimental Investigation of the Oxidizing Power of Slags in Steel Manufacture. Pt. I. Equilibrium Relationships in Liquid SiO_2-CaO-MgO, FeO, Fe_2O_3 Slags Melted in Open Crucibles at 1550 and 1650° C. in the Absence of Metallic Iron.** Trajan T. Negresco and Marie Bolgiu. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 5-32.

14 ref. (D11r; RM-q)

387-D. (German.) **New Knowledge in the Production of Pig Iron in the Blast Furnaces of the German Democratic Republic.** Georg von Struve and Rolf Ebert. *Bergakademie,* v. 10, Apr. 1958, p. 229-235.

19 ref. (D1)

388-D. (German.) **Hydrogen in Steel Production.** Werner. *Bergakademie,* v. 10, Apr. 1958, p. 251-253.

Reduction of content of hydrogen in steel in liquid state. 3 ref. (D11h, D11s; ST)

389-D. (German.) **Development of Methods and Explosive Charges for Tapping in Blast Furnaces or Other Metallurgical Melting Furnaces.** Werner Gutmann. *Explosivstoffe,* v. 6, May 1958, p. 105-108.

(D9n, D1c)

390-D. (German.) **Significance of Diffusion in the Reduction of Iron Ores.** L. V. Bogdandy and W. Janke. *Zeitschrift für Elektrochemie-Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 61, 1957, p. 1146-1153.

Theoretical formula derived from experimental results; the final formula can be used for predetermination of the reduction speed. 25 ref. (D11g, Fe)

391-D. (German.) **Kinetics and Mechanism of Reaction Between Liquid Alloys and Slags.** Carl Wagner. *Zeitschrift für Elektrochemie-Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 62, 1958, p. 386-389.

10 ref. (D11n)

392-D. (Russian.) **Increasing Blast Furnace Productivity by Grading and Sorting the Charge.** V. E. Levchenko. *Metallurg,* v. 3, May 1958, p. 4-6.

(D1a)

393-D. (Russian.) **Blowing Oxygen From Top of Bessemer Converter.** S. I. Lifshits and S. G. Afanas'ev. *Metallurg,* v. 3, May 1958, p. 12-16.

Change from acid to basic lining and directing oxygen blast from top instead of bottom of converter greatly improves qualities of steel. (D3f; ST)

394-D.* (Russian.) **Burden Hanging During Iron Smelting When Using Oxygen Enriched Blast.** S. K. Trekalo. *Stal',* June 1958, p. 489-495.

Frequent burden hangings in blast furnace when using oxygen-enriched blast is explained by extreme intensification of furnace operating rate even when ordinary blast is used. An insignificant increase of circumferential furnace gas velocity leads to burden hanging. Experiments with kryptol electric furnaces where burden hanging was eliminated. (D1a, D5a, D11g)

395-D.* (Russian.) **Influence of Combustion Zone Location on Blast Furnace Performance.** B. S. Failkov and V. K. Gruzinov. *Stal',* June 1958, p. 495-502.

Investigation of interdependence between parameters of the combustion zone and air blast and distribution of burden materials at the furnace top makes it possible to define more accurately the role of the boshes and to determine extent of protrusion of tuyeres into the furnace. Importance of proper location of combustion zones and maximum CO_2 content in the gas to blast furnace operations; need to more accurately relate distribution of burden to combustion zone. 21 ref. (D1, D11j, W17g, 17-51)

396-D.* (Russian.) **Dust Formation in Openhearth During Intensified Use of Oxygen.** Yun Son Chol' and E. V. Abrosimov. *Stal',* June 1958, p. 506-509.

Investigation of dust formation in openhearth furnace when using oxygen makes possible determination of mechanism of this phenomenon, the physical nature of dust particles and the fluctuation of dust formation rate during various stages of heat during modifications of the process. Increasing rate of oxygen enrichment increases dust formation since it speeds process of decarbonization. 5 ref. (D2g, D11g)

397-D. (Russian.) **Effect of Vacuum Melting on Quality of Steel.** Ya. M. Bokshitskii, A. V. Emyashev, A. M. Zubko and M. M. Filippycheva. *Stal',* June 1958, p. 520-525.

Vacuum melting of steel considerably improves metal composition, reduces impurities and gas content and improves mechanical properties, particularly its resilience. Experiments with structural steels show that vacuum melted steel (as compared with open melted), contains 5 times fewer impurities; oxygen content is reduced from 0.0140 to 0.0028%, nitrogen from 0.0109 to 0.0050%. 5 ref.
(D8m, P-general, Q-general)

398-D.* (Russian.) **"Superheating" of Chromium-Nickel Structural Steel.** L. D. Kossovskii and V. S. Pakuleva. *Stal',* June 1958, p. 556-558.

Formation of coarse crystalline fractures of Cr-Ni structural steels depends on cooling speed of the bloom before heat treatment (applied for the prevention of floc formation), and is not connected with temperature of heated ingots before rolling. Gradual, intermediate cooling of blooms before further heat treatment has considerably reduced spoilage. (D8q; ST, Cr, Ni, 9-72)

399-D. (French.) **Composition of Blast Furnace Gas. Applied to the Calculation of Coke Yield.** A. Decker and L. Bousmanne. *Revue Universelle des Mines,* v. 101, Mar. 1958, p. 80-105.

General formulas of gas volumes in relation to coke yield and different influencing factors (temperature, humidity, silicon content).
(D1b, D11; RM-j43)

400-D. (Russian.) **Lessening the Expenditure of Aluminum in Deoxidation of Steel.** A. M. Ofengenden and R. P. Nesterovich. *Metallurg,* v. 3, June 1958, p. 11-12.

(D11r; Al)

401-D. (Russian.) **Automatic Control of Blast Distribution Between Tuyeres of Blast Furnace.** V. Yu. Kaganov. *Stal',* June 1958, p. 504-505.

Decisive effect of blast—its temperature, volume and pressure—on productivity of blast furnaces.
(D1, D11j)

402-D. (Russian.) **Combined Secondary Cooling of Continuously Cast Steel Ingots.** A. D. Akimenko, A. M. Makushin and A. A. Skvortsov. *Stal',* June 1958, p. 509-511.

(D8q, D9q)

403-D. (Russian.) **Preparation of Mold Trains for Bottom Pouring of Steel.** S. N. Bystrov and V. M. Borevskii. *Stal',* June 1958, p. 513-514.

(D9k, D9p, W19c)

404-D. (Russian.) **Mechanization of Labor Consuming Operations in Electric Steel Melting.** M. G. Dmitrienko

and A. I. Sapko. *Stal'*, June 1958, p. 525-529.

(D-general, E10r, 18-74; ST)

405-D. (Russian.) **Effectiveness of Use of Oxygen in Ferrous Metallurgy.** V. F. Andreev. *Stal'*, June 1958, p. 561-568.

Production of steel by use of oxygen in converter is 50% cheaper than by openhearth. Soviet steel industry plans to increase output of steel by oxygen to 40% of total steel production. 13 ref. (D-general, A4p; O)

406-D.* **Vacuum Pouring of Ingots for Heavy Forgings.** J. H. Stoll. *Blast Furnace and Steel Plant*, v. 46, June 1958, p. 595-605.

Bethlehem Steel's research in vacuum pouring of ingots results in a process which cuts down on hydrogen content and prevents flaking in steel. A 7-ton and two 250-ton vacuum degassing units, composed of a mold within a sealed chamber, were set up and pouring made and tested. Hydrogen content averaged 0.5 parts per million against 1.5 parts in air cast material. Ductility and cleanliness were superior in vacuum casting. Initial and operating costs are much higher and hazards greater but process has proved practical for higher quality steel.
(D9k, D9b, D9s, W19c, 1-73)

407-D.* **Kinetics of Slag-Metal Reactions.** T. B. King. *Royal College of Science and Technology, Metallurgical Club, Journal*, no. 10, 1957-1958, p. 35-40.

Principles of reaction kinetics applied to the removal of Mn, Si, C, S and H during steelmaking. Calculated rates of removal agree well with those obtained in practice. 4 ref. (D11n; ST, RM-q)

408-D.* (German.) **Relation Between Indirect Reduction and Consumption of Coke.** Anatol N. Pochwisnew. *Freiberger Forschungshefte*, B25, 1958, p. 5-18.

Reduction coefficients used previously are unsatisfactory for calculations. Two new coefficients are introduced, one representing the consumption of coke (p) and the other representing the reducing power of the gas (g). Both coefficients are easily determined by an analysis of the waste gases. With the coefficients p and g, graphs and conclusions on the economy of a furnace can be obtained. 18 ref. (D1, D11j)

409-D.* (German.) **Shape and Dimensions of the Combustion Zone in a Furnace.** I. P. Bardin, L. Z. Chodak and L. M. Zyljew. *Freiberger Forschungshefte*, B25, 1958, p. 19-37.

Studies with a laboratory experimental furnace. The combustion zone behind the tuyere has a spheroidal shape. Effect of changes in the blast-air quantity, the blast temperature, the blast pressure, the tuyere diameter and the size of coke, on the size of the combustion zone, on its reduction zones and on the reduction speed. 15 ref.
(D11j, W17g)

410-D.* (German.) **Use of Oxygen-Enriched Air Blast in the Fabrication of Spiegeleisen in Low-Shaft Furnaces.** Helmut Grohmann. *Freiberger Forschungshefte*, B25, 1958, p. 53-69.

A 25.5% O-enriched air blast proved to be profitable because the loss of unused heat and valuable gases was reduced. Of equal importance is the grain size of the coke and the charge. With a large grain size of 5 to 40 mm. and a coke grain of 20 to 40 mm., the reduction and yield were improved. 10 ref. (D8p, D1a)

411-D.* (German.) **High Phosphorus and Sulphur-Bearing Charges in an Electric Arc Furnace, Using Pure Oxygen.** Karl-Friedrich Ludemann. *Freiberger Forschungshefte*, B26, 1958, p. 16-36.

This method provides a means of reducing melting time. After skimming the melted slag, dephosphorization takes place under a calcium phosphate slag poor in silicic acid. Pure oxygen supplied promotes desulphurization, oxidizing S to SO_2. The heat is completed under a slag similar to the openhearth slag. 20 ref. (D5d, D11s)

412-D. Ironmaking—Art or Science? H. A. Goldfein. *Blast Furnace and Steel Plant*, v. 46, June 1958, p. 611-614.

Operation of blast furnaces: quality of coke and limestone; handling of ore from unloading to furnace; temperature, humidity, pressure in operation of furnace; quality of slag. (D1b)

413-D. "Flocast" Method of Continuously Casting Iron Bar. H. E. Morris. *Foundry Trade Journal*, v. 105, July 3, 1958, p. 5-13.

Process brings increased dimensional accuracy, greater usefulness in bar automatics and general quality. (D9q, 1-52; CI, 4-55)

414-D. Steelmaking Progress in the U. S. Pt. 2. Use of Large Electric-Arc Furnaces. *Iron and Coal Trades Review,* v. 177, July 18, 1958, p. 143-146.

(D5)

415-D. For Refining Metals There's Nothing Better Than Vacuum. L. W. Johnson. *Product Engineering (Design Edition),* v. 29, Aug. 18, 1958, p. 72-74.

Current vacuum melting processes; advantages and disadvantages of each. (D8m, C25)

416-D. X-Ray Investigation of Cokes and Coals. A. M. Zubko and E. Z. Spektor. Paper from "Problems of Metallography and the Physics of Metals", U. S. Atomic Energy Commission, AEC-tr-2924, 1958, p. 32-38. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Structural changes in blast furnace coke as it moves from the charge hole to the burner and the tapping-hole regions: the coke in the charge hole has a lattice structure; as it moves from the charge hole to the bosh region the lattice structure is preserved and no signs of real graphitization are apparent. As the coke moves on to lower levels of the blast furnace it is graphitized, changing its physical and mechanical properties. 10 ref.
(D1, D11j; RM-j42, RM-j43)

417-D. Relation Between Desulfurization and Deoxidation of Steel. Z. Buzhek and A. M. Samarin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 9, Sept. 1957, p. 37-44. (Henry Brutcher, Altadena, Calif., Translation no. 4259.)

Effect of use of Al or Si added to the steel bath as deoxidizers (giving nongaseous deoxidation products) on rate of sulphur removal. Effect of desulphurization, after addition, of increase in temperature on rate of Si or Al. (D11s; *Si, Al,* ST, AD-r, AD-a)

418-D. Mechanism of Oxidation of Magnetite. V. I. Arkharov and B. S. Borisov. *Doklady Akademii Nauk SSSR,* v. 114, no. 2, 1957, p. 293-296. (Henry Brutcher, Altadena, Calif., Translation no. 4268.)

Lattice rearrangements at magnetite-hematite interfaces in iron scale during high-temperature oxidation and during such metallurgical processes as the reduction of hematite and the oxidation of magnetite. (D11r, M22g, M22h; RM-N, AD-s37)

419-D.* (Japanese.) Distribution of Oxygen in Molten Steel During Refining. Katumo Nagami, Minoru Koya and Yukio Nagano. *Sumitomo Metals,* v. 10, Jan. 1958, p. 1-4.

Samples taken from three doors of openhearth furnace show that oxygen content is influenced by iron direction. Sampling at middle door gave values near the mean for samples from the three doors.
(D11r, S12h; ST, *O*)

420-D.* Alternative Processes of Making Iron and Steel. A. G. Robiette. *Iron and Coal Trades Review,* v. 177, July 25, 1958, p. 209-216.

Operating principles of methods for making pig or sponge iron by means other than the blast furnace. (D8; 10-54)

421-D.* (French.) Relation of Blast Furnace Process to Hydraulic Value of Slag. J. Roquejoffre. *Revue des Materiaux,* no. 512, May 1958, p. 119-135.

Grinding tests were conducted on 21 samples of granulated slag from blast furnaces charged with identical ore and producing basic pig of same quality. Reactivity of slag was found to be related to its density, with density depending on fineness after grinding. Second series of tests was conducted on 52 samples taken from same furnace and ground to same degree of fineness and relation between blast furnace process and hydraulic value of slag was investigated. Run-off temperature of slag determines initial reactivity, and run-off temperature, density and $CaO:SiO_2$ ratio are closely interdependent. Compressive strengths of cements made from these slags were conditioned by apparent density of slag and run-off temperature.
(D1g, D11n; CI-a, RM-q)

422-D.* (German.) Deoxidation of Molten Steel With Calcium Aluminide and Its Effect on Analysis, Structure, Yield and Quality. Kurt Fellcht. *Freiberger Forschungshefte,* no. B22, 1958, p. 9-113.

CaAl deoxidation of openhearth and electric steels. CaAl treatment of openhearth steels gives a fine-grained steel of slightly reduced hardness, strength and elastic limit. Both steels, when deoxidized with CaAl, show a 10% increased yield/tensile ratio, an increased necking and a higher notch-impact value along the rolling direction. The notch impact value across the roll-

ing direction is lower for untreated steels. (D11r, Q6, Q23b, Q27d; ST-e, ST-f, AD-r 30)

423-D. Effect of Lithium on Certain Properties of an Austenitic Steel. R. P. Zaletaeva. *Metallovedenie i Obrabotka Metallov*, Sept. 1957, p. 25-27. (Henry Brutcher, Altadena, Calif., Translation no. 4262.)

Previously abstracted from original. See item 59-D 1958.
(D9s; ST, Li, AD-q)

424-D.* Reactions Between Iron Oxides and Alumina-Silica Refractories. Arnulf Muan. *American Ceramic Society Bulletin*, v. 87, Aug. 1958, p. 357-360.

Increasing the wall thickness, within the limits studied, has a minor effect on cooling time of the metal; increasing the porosity increases the cooling time; use of a covering material has a marked effect on heat losses and slows cooling of the metal in the hot top. Equations to aid in the design of hot tops are derived. 8 ref. (D9, W19c; RM-h36, Fe, Al, Si)

425-D.* Some Experiments With Steel Ingot "Hot Tops". M. E. Harnish and M. C. McQuarrie. *American Ceramic Society Bulletin*, v. 37, Aug. 1958, p. 357-360.

Small-scale model study of heat flow in the hot-top region. Effects of wall thickness, porosity and covering materials upon the cooling rate of the metal. 10 ref.
(D9p, W19c; ST, 9-68)

426-D.* (Swedish.) A Program-Controlled Reduction Test for Blast-Furnace Burdens. Rolf Linder. *Jernkontorets Annaler*, v. 142, no. 5, 1958, p. 246-266.

Reduction test carried out in barrel-shaped rotor laboratory furnace. Degree of oxidation after termination of test at 1000° C. indicates reducibility. Quantity of firing indicates disintegration during reduction. Satisfactory agreement was obtained between test and indirect reduction in blast furnace. 8 ref. (D1a, D11g, D11r; RM-n)

427-D.* (Hungarian.) Effect of Steam Injection on Blast Furnace Operation. Otto Farkas. *Kohaszati Lapok*, v. 91, Apr. 1958, p. 186-190.

Steam injection increases somewhat the amplitude of oxidizing zone, if in order to balance heat consumption of steam decomposition, temperature of blast steam is increased. Increase of moisture of blast injection changes composition of the air and that of gas formed in the blast. As a result of steam decomposition, oxygen and hydrogen contents of injection increase but nitrogen content decreases. Practically the entire quantity of hydrogen formed through decomposition of moisture takes part in reduction process and consequently the throat gas H_2 leaving the furnace increases little, and not in proportion to the humidity. Moisture content of blast may be increased to 30 g. per cu. m. without increasing the quantity of hydrogen in the raw iron. Higher humidity content of the blast stream results in decreased energy consumption. 11 ref. (D1h)

428-D. The Future of Oxygen in Steel. Eric Ford. *British Steelmaker*, v. 24, July 1958, p. 208-210.

(D10, D1h, D2g, D3f, D10; ST)

429-D. Distribution of Sulfur and Phosphorus Between Iron and Acid Slag. I. A. Tomilin and L. A. Shvartsman. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 418-423. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Equilibrium of the distribution of sulphur and phosphorus between liquid iron and a simple slag. Thermal effects of these processes. Sharp decrease of the distribution coefficients in comparison with the case of an iron slag is due to a change of the entropy term of the free energy. Hypothesis is advanced concerning the development of heat in the solvation of iron ions in the silicate slag. 7 ref.
(D11n; Fe, P, S)

430-D. A New Method for Studying Equilibria in the System Metal-Slag. V. F. Surov, O. V. Travin and L. S. Shvartsman. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 433-436. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

(D11n)

431-D. An Investigation of the Desulfurization of Cast Iron by Soda.

O. V. Travin and L. A Shvartsman. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 424-432. (Available from U. S. Office of Technical Services, Washington 25, D. C.; also available from Henry Brutcher, Altadena, Calif., Translation no. 3865.)

Previously abstracted from original. See item 128-D, 1957.
(D11s; Fe, AD-a)

432-D. Influence of Oxides of Alkaline Earth Metals on the Distribution of Sulfur Between Iron and Iron Slag. L. A. Shvartsman, I. A. Tomilin, O. V. Travin and I. A. Popov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 405-417. (Available from U. S. Office of Technical Services, Washington 25, D. C.; also available from Henry Brutcher, Altadena, Calif., Translation no. 4001.)

Previously abstracted from original. See item 226-D, 1957.
(D11n, 2-60; Fe, RM-q)

433-D. Use of Radioactive Isotopes in Studying the Kinetics of Scrap Melting and Slag Formation in the Scrap-Ore Process. A. I. Osipov, L. A. Shvartsman, V. I. Alekseev, V. F. Surov, M. L. Sazonov, M. T. Bulskii, S. A. Telesov, A. M. Skrebtsov, A. M. Ofengenden, L. G. Goldshtein and F. F. Sviridenko. *Soviet Journal of Atomic Energy,* v. 3, 1957, p. 1193-1197. (Translation by Consultants Bureau, Inc.)

Rate of scrap melting in experimental melts in 130 and 350-ton openhearth furnaces determined from the diminution in specific activity of metal samples containing Co^{60}. (D2d, D11q, 1-59; ST)

434-D. (French.) **Chronicle of Steelmaking. Competitive Position of the Martin Furnace.** G. Grenier. *Ecole des Mines et de la Metallurgie,* no. 3516, May 1958, p. 296-297.

(To be continued.)
(D2, A4, W18r; ST)

435-D.* (German.) **Plant Experiments on the Smelting of African Conakry Ore.** Wilhelm Wolf, Wilhelm vor dem Esche, Helmut Wysocki and Otto Steinbauer. *Stahl und Eisen,* v. 78, July 24, 1958, p. 1020-1027.

Experiments on fabrication of basic bessemer pig from a metallic burden with 30% Conakry ore, and on the fabrication of low-phosphorus iron from 100% Conakry ore, in a furnace of 800 tons daily output. The economy of the ore would increase if the metals and minerals present in the resulting slags were utilized. (To be continued.)
(D1a; CI-a)

436-D.* (German.) **Experiences in the Production and Processing of Small Sections Manufactured in the Continuous Casting Process.** Franz Leitner and Franz Schmidt. *Stahl und Eisen,* v. 78, July 24, 1958, p. 1028-1032.

Steels suggested are toolsteel with up to 0.9% C, low-alloyed Mn-Si, Cr-Mn and Cr-Mo steels. Best results were obtained when the time involved for the semi-liquid portion, from the mold to complete crystallization, was as short as possible. Initial pouring temperature and continuous casting speeds recommended. (D9q; AY, TS)

437-D.* (Russian.) **Smelting of Low-Manganese and Low-Phosphorus Iron.** B. N. Zherebin, V. P. Dembovetskii and V. M. Minkin. *Stal',* v. 18, July 1958, p. 578-585.

Elimination of Mn additions from blast furnace burden with consequent sharp reduction of Mn and P content in iron had no detrimental effect on quality. On the contrary, it substantially raised metallurgical value of iron for the openhearth and improved blast furnace performance characteristics. Manganese content was reduced from 1.78 to 0.54% and phosphorus from 0.26 to 0.15%; blast furnace productivity was increased by 5.4% while reducing coke consumption by 5.6%. 4 ref. (D1a; Fe, *Mn*)

438-D.* (Russian.) **Study of Continuous Casting of Steel With Models.** K. I. Afanas'eva and G. P. Ivantsov. *Stal',* v. 18, July 1958, p. 599-604.

By use of model method it was possible to define more accurately the hydrodynamic regularities of the metal flow in a cast billet and to develop methods for improving dimensions and shapes of casting devices. 5 ref. (D9q, 17-56; ST)

439-D.* (Russian.) **Properties of Oxygen Blown Steel Produced in Converters.** P. Ya. Ryzhkov, A. A. Mitrofanov and N. I. Beda. *Stal',* v. 18, July 1958, p. 643-647.

Mechanical properties of rimming or killed oxygen blown steel are practically the same as those produced in openhearth furnace. The

gas content and the macro and microstructures are nearly equivalent. Testing of converter and openhearth steel samples at various temperatures and after aging shows that their ductility is nearly the same. (D3f, Q-general; ST)

440-D. Operation of Blast Furnaces at High Top Pressure. I. A. Kuz'min. *Metallurg,* no. 7, July 1957, p. 3-5. (Henry Brutcher, Altadena, Calif., Translation no. 4243.)

Previously abstracted from original. See item 11-D, 1958. (D1h; Fe)

441-D. Study of Blast Furnace Process by Isotope Methods. I. P. Bardin, P. L. Gruzin and S. V. Zemskii. *Doklady Akademii Nauk SSSR,* v. 114, no. 6, 1957, p. 1220-1223. (Henry Brutcher, Altadena, Calif., Translation no. 4305.)

Principles of the currently used isotope methods and their advantages. Results obtained at four blast-furnace plants (different furnace sizes) on movement of stock and wear of furnace refractories. (D1, 1-59; Fe)

442-D. Production of Chromium-Nickel Steel With Use of Pelletized Nickelous Oxide. I. P. Zabaluev. *Stal',* v. 17, no. 10, 1957, p. 899-901. (Henry Brutcher, Altadena, Calif., Translation no. 4271.)

Previously abstracted from original. See item 96-D, 1958. (D-general, 6-67, 18-67, 1-52; ST)

443-D.* (German.) **Studies on Flow in Openhearth Furnace Regenerators With a Laboratory Model.** Michael Hansen. *Stahl und Eisen,* v. 78, June 12, 1958, p. 804-812.

An air current was led into a model checker chamber and the influence of different ratios of inside dimensions of distribution to main inside dimensions of checkerwork studied. Effects of a collection main leading in the same direction as the distribution main and a collection main leading in inverse direction. Placing the checker chamber under the superstructure of the furnace allows a flow parallel to a vertical plane within the distribution main and the checker chamber. (D2, S18q, W18r)

444-D.* Some Observations on the Slag Metal Equilibria Involved in Ferromanganese Production. N. J. Wadia, V. G. Paranjpe and S. Visvanathan. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 83-109.

Slag-metal equilibria in Mn-rich burdens were investigated to ascertain the effects of Mn content of the metal, slag composition and basicity, and temperature on the Mn and S distribution coefficients. The desulphurization reaction in Mn burdens follows the same pattern as in ironmaking, with the exception that the slags have a higher sulphur-bearing capacity owing to the formation of manganese sulphide. 28 ref. (D11n; Mn, Fe, AD-n)

445-D.* Desulphurization of Alloys in Hydrogen. B. Chatterjee and K. R. Sangameswaran. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 161-165.

Studies of removal of sulphur from powdered samples prepared from two specimens of cast iron and from fine drillings prepared from two samples of steel on heating for varying periods of time at 1000° C. in a current of dry hydrogen and in hydrogen containing 1.2% by volume of moisture. Moist hydrogen is more effective than dry hydrogen. 6 ref. (D11n; *S, H*)

446-D.* Direct Reduction of Iron Ore to Yield Usable Steel. Jatinder Mohan, P. K. Gupte and B. R. Nijhawan. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 247-262.

Crushed iron ore, dried and ground preferably finer than 70 mesh, is packed in a paper tube and embedded in solid charcoal in a sealed steel canister. The canister is heated to the reduction temperature and then raised to a sintering temperature of the order of 1100° C. for several hours depending on the carbon content required in the steel. A fairly compact steel bar is obtained after reduction which lends itself readily to hot working. 6 ref. (D8j; ST)

447-D.* Continuous Casting of Steel. V. Yavoisky and P. K. Sen. *Indian Institute of Metals, Transactions,* v. 11, June 1958, p. 27-56.

Advantages of continuous casting of steel over normal casting practice. Thermal loss in the process, and heat exchange in the ingot, both in the primary stage of solidification in the water-cooled mold, and in the subsequent stage of complete solidification outside the mold. Characteristics of the crystalline structure govern the nature of in-

side and outside defects of the ingots. 11 ref. (D9q, N12; ST)

448-D.* **Continuous Casting at Barrow.** I. M. D. Halliday. *Iron and Steel,* v. 31, Aug. 1958, p. 417-419.

Features of ladles, tun dish, mold and mold operation in the continuous casting of steel billets. Operational procedure, performance data and billet quality. (D9q)

449-D.* **Kaldo Process.** Bo Kalling and Folke Johansson. *Iron and Steel,* v. 31, Aug. 1958, p. 419-423.

Advantages of rotating vessel and oxygen lance; hot metal and product analysis; cooling ore additions, exhaust gas cleaning, fuel economy, steel yield, blowing time, steel impact resistance and production rate of Kaldo furnaces in refining low and high-phosphorus pig irons; life of furnace lining. (D10b)

450-D.* **Stirring in Steel Production. Mechanical and Inductive Stirring in the Arc Furnace.** Arne Faerden. *Metallurgia,* v. 58, Aug. 1958, p. 57-63.

Both methods increase the speed of the reaction between steel and slag and thus improve deoxidation and desulphurization. Since the inductive method gives continuous stirring, it will undoubtedly effect more speedy refining under some conditions than can be obtained by mechanical stirring under those same conditions. Reference is also made to blowing gases or metallic vapors through the melt, reladling and rotating the furnace. 33 ref. (D5f)

451-D.* (French.) **Pretreatment of Lorraine Ores and Blast Furnace Performance.** Ch. G. Thibaut. *Revue de Metallurgie,* v. 55, June 1958, p. 513-522.

From analysis of performances of a large number of blast furnaces, a method is derived for calculating burden, coke rate and top gas composition. Method is applied to operations using self-fluxing Lorraine ores in different stages of preparation (run-of-mine condition, crushed and sized, totally sintered, and combinations of these). Thermal balance is determined for each case. 8 ref. (D1, B-general; Fe)

452-D.* (Czech.) **Deoxidation and Alloying of Steel for Very Heavy Ingots.** Alexander Dekanovsky. *Hutnicke Listy,* v. 13, no. 7, 1958, p. 577-586.

Method includes separate production of deoxidizing and alloying pre-alloy in a small oil or electric furnace, pouring the pre-alloy into tilting openhearth furnace or possibly a ladle. Preliminary oxidation with silico manganese in the furnace. (D2c; ST, 5-59)

453-D.* (German.) **Linz-Donawitz Process With Pig Irons of High Phosphorus Content.** Herbert Trenkler and Rudolf Rinesch. *Stahl und Eisen,* v. 78, June 26, 1958, p. 883-890.

Pilot operations in a 30-ton crucible to determine feasibility of processing pig iron up to 1.5% P in converters with the L-D process. Two slags are required, the first bringing P content down to 0.5% and leaving carbon content at 1.5 to 2%. An early slag formation is desirable and fine ores are added at the end of the first period. The second period is the same as with low P contents. To separate slag and steel properly a tap was built into the top of the crucible. The blasting process takes 12 min. more than on normal pig iron. Information on the Phoenix-Lance (PL) blasting process. 13 ref. (D10a; CI-a, *P*)

454-D.* (Polish.) **Analysis of Repair Costs and Analysis of Production Indicators of Basic Openhearth Furnaces With Silicate and Chromite-Magnesite Roofs.** Wladyslaw Hansel. *Hutnik,* v. 25, Apr-May 1958, p. 142-156.

Comparison of refractories consumption, repair time and repair costs. Graphs of durability of silicate and chromite-magnesite roofs. Influence of introduction of chromite-magnesite roofs upon steel output. 3 ref. (D2, W18r, 18-72; RM-h)

455-D. **Piping and Segregation.** G. Reginald Bashforth. *British Steelmaker,* v. 24, Sept. 1958, p. 288-293.

Causes of piping and segregation in steel ingots. Value of various types of refractory hot tops. Good casting pit practice is of decisive importance. 7 ref. (D9k, D9p, 9-67, 9-69; ST)

456-D. **Probe Key Melting Variables.** P. M. Unterweiser. *Iron Age,* v. 182, Sept. 11, 1958, p. 165-168.

New facts on consumable arc remelting under vacuum. (D8m, T1f, 1-52; ST)

457-D. **Can Ultrasonics Improve Steel Ingot Quality?** P. M. Unter-

weiser. *Iron Age,* v. 182, Sept. 11, 1958, p. 178-180.
(D9; 1-74; ST)

458-D.* New Process Yields Quality Pig—Small-Scale Direct Reduction of Iron Ore. Albert de Sy. *Iron Age,* v. 182, Sept. 18, 1958, p. 92-94.

Uses carbon as reducing element and electricity as energy source. On a pilot-plant scale, it produces both a high-grade pig iron and a quality carbon toolsteel. Intended for the reduction of Fe-rich ores with an Fe content of at least 65%. Except in special cases, it is not a tonnage steel process. Applications: small-scale production of pig iron, high-quality virgin Fe as base material for high-quality alloy steels, and special pig Fe for the production of ferritic nodular Fe.
(D8j, 16-61; CI-a, TS)

459-D. Manufacture of Pig Iron and Steel in Czechoslovakia. Dr. Jaroslav Horak. *Czechoslovak Heavy Industry,* June 1958, p. 12-20.

(D-general, W18, 1-55; CI-a, ST)

460-D. Czechoslovak Metallurgical Industry and Its Perspective. Josef Hlavacek. *Czechoslovak Heavy Industry,* June 1958, p. 7-11.

(D-general, C-general, W18; Fe, Al, Ni)

461-D.* (German.) **Experimental Converter With Basic Refractory and Continuous Temperature Recording and Determination of End Points.** Wilhelm Anton Fischer and Manfred Wahlster. *Stahl und Eisen,* v. 78, May 15, 1958, p. 646-654.

Experimental basic converter for 250-kg. burden operates at same characteristics and under same conditions as large-scale converters. Experiments covered the sequence of reactions in basic bessemer pig iron inside furnace in relation to oxygen enrichment of blast, temperature, pig iron components and limestone charges. Behavior of C, P, Mn, Si and N. A thermocouple was used for determining the temperature. 21 ref. (D3f, 1-65; ST)

462-D.* (German.) **Application of Natural Gas Fuel in Openhearth Furnaces in Austria.** Friedrich Huber and Hans Mraz. *Stahl und Eisen,* v. 78, May 15, 1958, p. 654-657.

In oil heated openhearth furnaces 60 to 75% natural gas was used as fuel. Choice of a suitable burner, design of gas pressure regulating equipment and reversing mechanism. Infuence of carburization upon furnace yield and economy of operation. A 25% carburization of the oil permits a considerable saving in compressed air, offsetting the slightly lower heating efficiency and warranting a fast amortization of additional equipment. 4 ref.
(D22; RM-m35)

463-D.* Modified Wrought Iron Has Greatly Improved Corrosion Resistance. *Industrial Heating,* v. 25, Sept. 1958, p. 1788, 1790, 1792, 1794.

Wrought iron with improved physical and mechanical properties and greatly increased corrosion resistance due to modified composition. Extent of deoxidation of base metal is increased; phosphorous content is increased; more siliceous slag is added in processing.
(D8h, R-general, 2-60; Fe-m)

464-D.* Process Adds Economy to Electric Furnace Smelting. *Iron Age,* v. 182, Oct. 9, 1958, p. 81-83.

New direct reduction process, with partial pre-reduction of ore before charging to furnace, is economically feasible. (D8j)

465-D.* Large Electric-Arc Furnace Steelmaking Experience in the U. S. A. A. C. Ogan and D. J. Carney. *Iron and Steel Institute, Journal,* v. 189, Aug. 1958, p. 307-314.

Trends and development in furnace design, refractories, transformer capacities, electrode regulator controls and other auxiliary equipment. Cold charge and hot metal operating practices for making carbon steel; alloy and stainless experience; operating data for production of carbon steel. Economics of electric versus openhearth furnaces. 17 ref. (D5, W18s; ST)

466-D.* (German.) **Kinetics of the Steelmaking Process.** Ludwig von Bogdandy, Walther Dick and Ivan N. Stranski. *Archiv für das Eisenhüttenwesen,* v. 29, June 1958, p. 329-337.

Survey of theoretical knowledge of steelmaking in converters and openhearth furnaces. Experiments on decarburization and dephosphorization. Relations along the refractory and atmosphere boundaries and the velocity of phase transformation of nitrogen and carbon monoxide in liquid iron. 55 ref. (D11; ST)

467-D.* (German.) **Properties of Iron and Steel Melts in High Vacuum.** Wilhelm Anton Fischer and Alfred Hoffmann. *Archiv für das Eisenhüttenwesen,* v. 29, June 1958, p. 339-349.

On heats with 0.001 to 3.5% C the properties of iron in high vacuum (10^{-5} to 10^{-3}) were observed and the behavior of nonmetallic elements (N, H, P, As, S, C, O) and metallic impurities (Mn, Si, Cu, Mg, Ca, Al, Zr) was studied in relation to melting time and refractory material. Refractories were electromagnesia, electrocorundum, statistical zirconium oxide, calcium carbonate, lime and dolomite. 35 ref. (D8m; Fe, RM-h)

468-D.* (German.) **Plant Experiments on the Smelting of (African) Conakry-Ore. Pt. 2. Removal of Chromium by Supplying Pure Oxygen to the Melt.** Wilhelm Wolf, Wilhelm vor dem Esche, Otto Steinhauer and Helmut Wysocki. *Stahl und Eisen,* v. 78, Aug. 7, 1958, p. 1100-1107.

By supplying pure oxygen under the surface of a basic bessemer melt, the Cr content was reduced from 0.8% to 0.1%. Temperature regulated by adding partly deoxidized roll scale. Oxidation of elements present in Fe occurs in the sequence: Si, Mn, V, Cr. It is necessary to completely oxidize the Si and to rather completely oxidize the Mn, before Cr can be attacked. A certain amount of oxidation of C and P is inevitable. 8 ref. (D3, D11r; *Cr*)

469-D.* (Russian.) **Production of Fluxed Sinter From Kerch Iron Ores and Its Use in Blast Furnaces.** I. V. Raspopov, Ya. S. Gorbanev and D. V. Gulyga. *Stal'*, v. 18, Aug. 1958, p. 676-682.

Use of Kamyshburun sinter in 'Azovstal' blast furnaces improved quality and reduced costs. Recommends better separation of sinter fines by screening at sintering plant and sharp reduction of the number of sinter reloadings during transportation and at plant. By charging blast furnace with 80% sinter and 20% iron ore with increased basicity to 0.6 resulted in a 6% increase in blast furnace productivity, an 8% reduction in unit expenditure of coke, a 10 ruble reduction in cost per ton of pig iron and a 32% decrease in limestone. (D1a, B16a; Fe)

470-D.* (Russian.) **Investigation of Descent of Burden Materials in Blast Furnace by Radioactive Indicators.** G. G. Lukashev, Ya. S. Gorbanev and L. D. Prikhod'ko. *Stal'*, v. 18, Aug. 1958, p. 682-687.

Distribution speeds of burden over furnace cross section and along its height. Burden moves with minimum speed at periphery and maximum speed at the coke combustion zones near the tuyeres. Under given conditions materials can move with maximum speed at the axial part of furnace. Maximum speed is at the upper part—to 10 m. per hr. It slows down at the mid part to 4-5 m. and at the lower third to 3.5 m per hr. (D1a, 1-59)

471-D.* (Russian.) **Preliminary Refining of Pig Iron in Ladles by Injection of Steam-Oxygen Mixture.** Ya. A. Shneerov, A. G. Derfel' and A. G. Kotin. *Stal'*, v. 18, Aug. 1958, p. 694-702.

Injection of steam-oxygen reduces Si, Mn, C and S, but does not reduce the P content. Introduction of oxidizing and slag-forming additions speeds oxidation and increases the pig iron temperature to a certain extent. There is a 0.15% loss of metal as result of steam-oxygen injection. 7 ref. (D1d, D1h)

472-D.* (Russian.) **Mass Production of Semi-Killed Steel for Manufacture of Mine Supports.** V. V. Leporskii, S. S. Petrov and V. M. Presnyakov. *Stal'*, v. 18, Aug. 1958, p. 702-706.

Production of semikilled Si-free steel containing approximately 1.0% Mn, which equals in quality killed steel for mine supports, considerably increased the output of rolled steel due to the reduction in cropping in the blooming mill and improved performance in the open-hearth. Production practice for semikilled steel is similar to that of rimming steel of ordinary quality. Most effective way of reducing semikilled steel is by addition of ferromanganese to furnace and to ladle. 4 ref. (D2, T28m, 17-57; ST-k)

473-D.* (Russian.) **Optimum Temperature Conditions for Melting Rimming Steel Using Phosphorus Iron.** A. S. Kharitonov and M. T. Bul'skii. *Stal'*, v. 18, Aug. 1958, p. 706-709.

Rimming steel made in rotary openhearth furnace with charge containing 75% phosphorus iron with composition of 0.6% Si, 2.0% Mn, 1.6% P and 0.08% S. The starting temperature was between 1510 and 1590° and before reduction it rose to 1570-1640°. (D2; ST-d)

474-D.* **Modern Attacks on Iron Ores.** C. F. Hoffman. *Metal Progress,* v. 74, Sept. 1958, p. 67-70.

While direct reduction will be applied commercially in some locations it will not supplant the blast furnace, one of the most efficient metallurgical tools in use. To meet the increased future needs for more Fe, steel mills will strive for higher production from existing furnaces by means of technological improvements. With beneficiated raw materials and newly developed uses of oxygen and other techniques, production in the same size blast furnace used in 1940 can be increased 67%. (D1, D8, B16; Fe)

475-D.* (Russian.) **Refining of Iron in Ladle With Steam-Oxygen Mix.** Ya. A. Shneerov, A. G. Derfel' and A. G. Kotin. *Metallurg,* v. 3, Aug. 1958, p. 11-14.

To make the maximum use of oxygen the Azovstal' plant experimented with preliminary refining of pig iron with oxygen in the ladle. This lowers the Si content from 0.7 to 0.3% with a resultant 15% increase of openhearth productivity. To get the best results with oxygen-treated pig iron, it is necessary to substantially increase the proportion of pig within the over-all metal portion of the charge. At Azovstal', pig iron makes up 75% of the metal in the charge. Lowering Si content of charge makes possible a phosphate slag with increased content of P_2O_5. (D9m, D11r; CI-a)

476-D. Rare Earths Homogenize Ingots. W. G. Wilson. *Iron Age,* v. 182, Oct. 2, 1958, p. 78-79.

Summary of two Russian reports on effect of rare earths on sulphur content and rolling properties of low-carbon steel.
(D9r, D11s, F23; CN-g, *S, EG-g*)

477-D. (Russian.) **Influence of the Order of Addition of Alloying Elements on Quality of Steels With Aluminum.** A. K. Petrov, V. K. Petrov and E. D. Mokhir. *Stal',* v. 18, Aug. 1958, p. 742-744.

Determination of the best order for addition of Al and V has sharply reduced the number of rejects caused by cleavage and stained heterogeneity. 6 ref.
(D2c, D5c, D9m; ST, *Al, V,* AD-n)

478-D.* **Recent Developments in Iron Smelting and Steelmaking Processes.** W. M. Armstrong. *Canadian Mining and Metallurgical Bulletin,* v. 51, Sept. 1958, p. 574-576. (Also in *Transactions,* v. 51, 1958, p. 324-326.)

Development of new processes and re-examination of existing smelting and steelmaking techniques. Dwight-Lloyd-McWane process; Demag-Humbolt process; Lubatti process; flame reduction processes; Wiberg-Soderfors process; various brick kiln processes; rotary kiln process; Krupp-Renn process; fluidized bed process; Madaras process; direct-ore-to-steel process; Linz process; Kaldo process. 16 ref.
(D8, D10; ST)

479-D.* **Some Uses of Oxygen in Steelmaking.** A. G. Raper and K. H. Hoyle. *Iron and Steel,* v. 31, Oct. 1958, p. 499-503.

Converter, L-D, Kaldo and Rotor processes and their future applications in the United Kingdom. 13 ref. (D3f, D8, D10; ST)

480-D.* **Continuous Casting of Steel.** Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 87-102.

General survey of the process in various countries. Essential details of experimental and industrial plants. Special attention to Soviet technology. (D9q; ST)

481-D.* (Russian.) **Influence of Pouring Conditions on Quality of Sheet Steel.** G. A. Chikalenko and E. V. Shevbunov. *Metallurg,* v. 3, Aug. 1958, p. 14-16.

By increasing the speed with which carbon and boiler steels are poured into the ingot molds many surface defects are eliminated. These defects are due to localized concentrations of nonmetallic inclusions, which are eliminated by more rapid pouring.
(D9p, 9-69; ST, 4-53)

482-D.* **Research on the Use of Pure Oxygen in Refining Processes.** Paul Metz. *Blast Furnace and Steel Plant,* v. 46, Oct. 1958, p. 1065-1069.

Experimental work in Belgium to improve scrap rate and modify development of metallurgical processes in basic bessemer converter includes simultaneous top and bottom blowing, with top-blow lance also used for injection of lime powder. Studies have resulted in new steelmaking process called O-C-P process. 23 ref. (D10; ST)

483-D.* **Vacuum Casting Tames Supermetals.** *Steel,* v. 143, Oct. 20, 1958, p. 191, 194, 196.

An initial charge is placed in the furnace and chamber evacuated. Power is then applied, and as the

charge starts to melt, additional metal is added from a charge chamber. When the charge is molten, alloying elements can be added from a separate additions chamber. An immersion thermocouple indicates correct bath temperature, the batch is poured, the mold moved into the cooling chamber, and the furnace is ready for another charging. Benefits include longer part life, reduced scrap losses, lower requirements for costly alloying elements.
(D8m, C25; ST, SGA-h)

484-D.* **Recent Advances in the Direct Reduction of Iron Ores.** J. Astier. Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 57-65.

Laboratory experiments on reduction processes using gases at very high temperature, as in the Cyclosteel process; perfection on the semi-industrial scale of a process for reducing rich, pure ores with hydrogen; the H-iron process; the Krupp-Renn process. Experience with the electric low-shaft furnace. 21 ref. (D8j; Fe)

485-D.* (Russian.) **Blast Furnace Practice at the Kuznetsk Metal Works.** N. N. Chernov. *Metallurg,* v. 3, Sept. 1958, p. 4-7.

Most of these furnaces work on low-manganese wrought iron, with 0.76 Si, 0.53 Mn, 0.049 S and 0.15 P. Heat, fuel and charge mix that will assure maximum productivity worked out for each of these furnaces. Approximate composition of a charge is 75% agglomerate, 1.0-2.0% Magnitogorsk ore and 23-24% Tashtagol'ski ore. The basicity is agglomerate is 1.4 with average Fe content of 51-52%. Limestone expenditure is 55-60 kg. per ton of iron. Gas pressure 0.6-0.65 atm. (D1; Fe)

486-D.* (Russian.) **Utilization of Manganese as Ferromanganese in Oxygen Enriched Blast Furnaces.** A. N. Red'ko. *Metallurg,* v. 3, Sept. 1958, p. 7-10.

Smelting ferromanganese from ore with 36-45% Mn. Coke has 1.6-1.8% sulphur, 11% lime and 2-7% moisture. Oxygen content in blast during smelting is 30-33%. Economies result from smelting with basic slag with increased Si content.
(D1; Fe, Mn, AD-n)

487-D.* (Russian.) **Melting Transformer Steel Under Vacuum.** I. S. Prvanishnikov. *Metallurg,* v. 3, Sept. 1958, p. 16-17.

Sixteen test melts were made in vacuum furnace with 150-kg. capacity in melting transformer steel under vacuum of 0.5-1.0 mm. Hg. Conclusions were that vacuum should be used only after melting of the charge. It is better to pour metal without vacuum, preferably in an inert atmosphere. Ferrosilicon should be introduced under vacuum. To sublimate Si from liquid metal, the metal with Si should be exposed under vacuum at 0.5-1.0 mm. Hg for no longer than 10 min. (D8m; ST, SGA-n)

488-D.* (Russian.) **On Overcharging Electric Furnaces.** A. I. Sapko and Z. I. Sapko. *Metallurg,* v. 3, Sept. 1958, p. 20-21.

There is a danger in overcharging furnace by more than 30% without reconstructing it and increasing power of its transformers. Contrary to expectation, overloading furnace does not increase output but disorients and disrupts equilibrium, thus lowering productivity. Increases in furnace output should be sought in the direction of improving the electrical regime of the furnace; intensification of melting by use of oxygen; improving mechanical equipment for air-blast.
(D5; ST)

489-D.* (Rumanian.) **Desulphurizing Power of Blast Furnace Slags Ability of Liquid Slags of SiO_2-Al_2O_3-CaO System to Absorb Sulphur at Temperatures of 1460 and 1550° C.** Traian Tr. Negrescu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 49-64.

Experimental slags were prepared by melting in the electric furnace at 1460 and 1550° mixtures of 10 g. of pure silica, alumina and calcium oxide in the presence of synthetic pig iron (24 g.) without manganese but containing 0.8% sulphur. The purpose was to determine the maximum quantity of sulphur which can be absorbed by 100 g. of each one of the slags under conditions of equilibrium. The results confirm the fact that in liquid slags of the ternary system SiO_2-Al_2O_3-CaO, the silica present combines with a part of the lime to form groups which are inactive from the point of view of desulphurization. Aluminum does not participate directly in the desulphurization process in the temperature ranges investigated. Thus the desulphurization is due only to that part of the lime which is not tied up in the formation of the 5 CaO·8 SiO_2. 3 ref. (D11n, D1)

490-D. (Russian.) **Production of Open-hearth Phosphate-Slag at the Azovstal' Mill.** F. F. Zviridenko and A. N. Popova. *Metallurg,* v. 3, Aug. 1958, p. 20-22.

(D2d)

491-D.* **Vacuum Pour Giant Ingots to Make Flake-Free Forgings.** *Iron Age,* v. 182, Oct. 30, 1958, p. 81-83.

Achieving a vacuum by the use of multi-stage steam evacuators instead of mechanical pumps, the process yields large forgings that show no flakes, no hydrogen embrittlement, fewer and smaller inclusions. Reason for melting or pouring steel in a vacuum is to reduce its gas content, particularly the hydrogen content.
(D8m; ST, 4-51)

492-D. **New Experience in the Continuous Casting of Steel.** H. Krainer and B. Tarmann. *Iron and Steel Institute, Journal,* v. 190, Oct. 1958, p. 105-111.

Construction, life and cooling of ingot molds used at one plant. Three methods for studying the cooling of rectangular sections; data on rates of casting that can be achieved. Dangers of using superheated metal and of irregularities in cooling. 19 ref. (D9q; ST)

493-D.* **Control of Flow of Liquid Metal During Continuous Casting.** W. Siegfried and B. Broniewski. *Iron and Steel Institute, Journal,* v. 190, Oct. 1958, p. 162-165.

Electromagnetic method of controlling supply of liquid steel in a continuous-casting installation in a mill designed to produce welding rod. (D9q, S18q; ST, 14-60)

494-D.* **Casting Pit Practice.** G. Reginald Bashforth. *Sheet Metal Industries,* v. 35, Oct. 1958, p. 782-791.

Importance of quality of the original ingot in production of high-quality sheet. Defects which can occur in steel ingots, namely; ingot cracks, piping segregation, blowholes, surface defects, nonmetallic inclusions. Solidification of a steel ingot into distinct stages of chill, columnar and equiaxed crystals.
(D9; 5-59; ST, 9-67, 9-68, 9-69)

495-D.* (Dutch.) **Recent Developments in Steelmaking.** B. Ulrich. *Metalen,* v. 13, Sept. 15, 1958, p. 304-312.

Advantages and disadvantages of basic bessemer process compared with openhearth. New and improved methods for production of converter steel, namely, the LD process (Austrian) in which oxygen of high purity (98.5-99.5%) is blown on the bath in the converter by a water cooled lance, the "Rotor" process (German) in which oxygen is blown through the bath in a rotary furnace and the "Kaldo" process (Swedish) in which oxygen is blown on the bath in a rotary furnace. (D10; ST)

496-D.* (Rumanian.) **Reduction of Iron Minerals, Siderite and Limonite, of the R. P. R. M. Ispas.** *Studii si Cerectari de Metalurgie,* v. 1, Jan-June 1956, p. 65-73.

Attempt to establish the behavior of these minerals during their reduction under various conditions of temperature, grain size and output of reducing gas. Raw and roasted siderites were used. Experiments show that the beginning of reduction is characterized by a higher degree of reduction for the roasted siderite. The grain size used was 20 mm. and the yield of the gas was 0.5 liter per min. 10 ref. (D1; Fe)

497-D. **Modern Blast Furnace Operation.** J. H. Strassburger. *Iron and Steel,* v. 31, Oct. 1958, p. 491-496.

Use of oxygen, moisture and high top pressure. (D1)

498-D. **Review of the Iron and Steel Industry in 1956.** I. P. Bardin. Paper from, "Advances in Steel Technology in 1956", United Nations, 1958, p. 1-21.

Rates of increase in iron and steel output with present levels; blast furnace production; technological advances in steelmaking processes; openhearth production; methods of using oxygen in the converter process; electric furnace steelmaking. (D-general)

499-D. **Chemical Equilibria in the Basic Bessemer Converter.** A. Decker. *Archiv für das Eisenhüttenwesen,* v. 28, Feb. 1957, p. 57-64. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 830.)

Previously abstracted from original. See item 139-D, 1957.
(D3, D11s; ST)

500-D. **A Comparison of Two Carbon Bricks for a Blast Furnace.** *Instituto Nacional del Carbon Boletin*

Informativo, Jan-Feb. 1957, p. 16-20. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(D1b; RM-h39)

501-D. A New Method of Electrode Control With Magnetic Amplifiers. W. Kafka. *Stahl und Eisen,* v. 76, Apr. 5, 1956, p. 381-389. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 187-D, 1956. (D5; ST)

502-D. Increasing the Range of Dephosphorization Before Decarburization During Refining of Pig Iron With Pure Oxygen. H. Kosmider, H. Neuhaus and H. Schenk. *Stahl und Eisen,* v. 77, Sept. 19, 1957, p. 1277-1283. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 843.)

Previously abstracted from original. See item 343-D, 1957.
(D10, D11r; ST)

503-D. Some Problems of Gas Movement in Low-Shaft Furnaces. N. P. Tabunshchikov. *Zhurnal Prikladnoi Khimii,* v. 30, no. 5, 1957, p. 710-716. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-55J19R.)

(D8n)

504-D. Lighting Flicker Caused by Electric Arc Furnaces. W. E. Schwabe. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 93-100.

Erratic changes of arc length caused by external and internal forces and random contacts between collapsing scrap are responsible for current swings. Degree of disturbance depends on relation of furnace load to capacity and network of the local power system. Hollow electrodes reduce swings appreciably; while sensitivity of incandescent light bulbs decreases with increasing wattage rating of the bulbs. (D5, W18s; ST)

505-D. Kinetics of Reduction of Magnetic Iron Ore at the Transformation Temperatures of Iron. M. I. Kochnev and A. F. Plotnikova. *Izvestiya Akademiia Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, 1958, p. 118-121. (Henry Brutcher, Altadena, Calif., Translation no. 4340.)

Search for a possible relationship between change in properties of iron at its transformation temperatures and rate of reduction of iron oxides under the same conditions. Data on fluctuations of rate of reduction of magnetite by hydrogen as function of temperature. Changes in electronic state of the iron atoms and not of the crystal lattice as basic cause of anomalies in chemical and physical processes.
(D11r; Fe)

506-D. Effect of Basicity of Sinter Upon Coke Consumption and Production of Blast Furnaces. I. B. Strashnikov. *Stal',* v. 18, no. 5, 1958, p. 398-402. (Henry Brutcher, Altadena, Calif., Translation no. 4298.)

Previously abstracted from original. See item 324-D, 1958. (D11, D1)

507-D.* (Russian.) **Production of Forge Pig Iron.** N. E. Dunaev, E. G. Ostrovskii and N. N. Popov. *Metallurg,* v. 3, Aug. 1958, p. 8-10.

The Stalinsk Steel Mill, as a result of using low-Mn (0.8-1.2%) iron ore was able to reduce expenditure of Mn ores by 50%, increase blast furnace output by 6% with a 20-ruble saving per ton. Effective use of the low-Mn smelting method requires proper proportion of iron ores to dolomite-limestone. (D1a; CI-a, *Mn*)

508-D.* Vacuum Stream-Degassing. K. C. Taylor. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 157-160.

History of stream degassing; its current status in iron and steel industries. Properties and applications of stream degassed steel; operating procedures and cost; equipment design. (D8m; ST)

509-D. A Review of European Steel Plant Progress—1957. R. C. McMichael. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 73-77.

(D-general; ST)

510-D. Carbon Black in Fuel Oil for Open Hearth Furnaces. G. W. Teskey, Jr. *Iron and Steel Engineer,* v. 35, Oct. 1958, p. 71-77.

Improved furnace production was obtained through the addition of carbon black with an improvement of about 1.5% for each per cent of carbon added. (D2g; RM-k30)

511-D. Accelerated Firing Rates in Open Hearth Furnaces. E. T. W. Bailey. *Iron and Steel Engineer,* v. 35, Oct. 1958, p. 124-128.

Increase of heat input to open-hearths from 750 to 1450 gphr. (125 to 220,000,000 Btu.) with concurrent improvement of other phases increased output from 16,000 to 23,500 tons per month. (D2h)

512-D. **Continuous Casting of Steel n France.** P. Thomas. *Iron and Steel Institute, Journal,* v. 190, Oct. 958, p. 112-113.

(D9q; ST)

513-D. **Continuous Casting of Steel in Western Germany.** K. G. Speith and A. Bungeroth. *Iron and Steel Institute, Journal,* v. 190, Oct. 1958, p. 158-161.

10 ref. (D9q; ST)

514-D. **Slag—Iron-Blast-Furnace.** Wallace W. Key. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1957, 9 p.

Production, consumption and technology of steelmaking slags. (D1g; RM-q)

515-D. **Vacuum Melting of Steels and Other Iron-Base Alloys.** H. Zakowa. *Instytutow Ministerstwa Hutnictwa,* v. 8, no. 8, p. 207-214. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 402-D, 1956. (D8; ST)

516-D. **Processes Occurring in the Bosh of Blast Furnaces Operated on Oxygen-Enriched Blast.** I. P. Bardin and M. Ya. Ostroukhov. *Izvestiya Akademiia Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 2, Feb. 1958, p. 7-14. (Henry Brutcher, Altadena, Calif., Translation no. 4299.)

Data on processes obtained with improved sampling equipment. Causes of irregular working of furnace when on O_2-enriched blast. (D1b, D1h; Fe, *O*)

517-D. **A Blast-Furnace Top Distributor of New Design.** A. S. Ayukov. *Stal',* v. 16, no. 11, 1956, p. 975-976. (Henry Brutcher, Altadena, Calif., Translation no. 4309.)

Advantages. Reliable sealing of top charging equipment; operational dependability at increased internal furnace pressures; simple construction; economical operation. (D1, W17g; 17-51)

518-D. **Operation of Russian Blast Furnaces With a High Top Pressure of 1.3 Atms.** E. G. Tetereviatnikov. *Stal',* v. 17, Mar. 1957, p. 200. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item no. 291-D, 1957. (D1h, 1-52; Fe)

519-D. **Study of Secondary Cooling With Air-Water Mixtures in Continuous Casting.** A. D. Akimenko. *Stal',* v. 18, no. 6, 1958, p. 509-511. (Henry Brutcher, Altadena, Calif., Translation no. 4310.)

Preliminary experiments on secondary cooling of continuous-cast billets with mixtures of water and air instead of water sprays alone. (D9q)

520-D. **Experience in the Production and Hot Working of Light-Section Continuous Cast Steel.** F. Leitner and F. Schmidt. *Stahl und Eisen,* v. 78, no. 15, 1958, p. 1028-1032. (Henry Brutcher, Altadena, Calif., Translation no. 4330.)

Design characteristics of Breitenfeld (Austria) continuous casting plant. Casting practice. Advantages and fields of application. (D9q; ST)

521-D. (Russian.) **Efficient Method for Charging Blast Furnaces.** L. Ya. Shparber. *Metallurg,* v. 3, Sept. 1958, p. 10-11.

Automation of charging of large blast furnaces; assembly, weighing and mixing of materials using a scale car, charging skip and tubular vibratory conveyors. (D1a, W12b)

522-D.* (German.) **Behavior of Various Slag Compositions During Operation and Their Influence Upon Production Results.** Wolfgang Heerwagen. *Neue Hutte,* v. 3, June 1958, p. 351-357.

In a Renn furnace experiments were conducted to determine optimal slag composition. The ratio $CaO + MgO = 0.18$ up to 0.19 was found to be more advantageous than more basic slags. Influence of CaO, clay, and other oxides. Operating results evaluated graphically. (D11n; ST)

523-D.* (German.) **Behavior of Chromium in the Basic Bessemer Converter.** Paul Goldstein and Erwin Eickworth. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1235-1246.

Chromium percentages up to 1.85% can be reduced to 0.1% by

pre-refining with air or air plus oxygen. If a Cr content of 0.06% in the steel is not to be exceeded, a percentage of less than 0.15% in the crude iron is suggested. Recommended initial temperature in refining: 1400° C.; reduced temperature during second half of time, final temperature: 1350° C. Sufficient slag quantity important; with 1.85% Cr, 100 kg. slag per ton iron, high Cr percentage in rimmed steel is harmful in rolling.
(D3, 1-65; AY, *Cr*)

524-D.* (German.) **Experiments on Reduced Top Discards of Steel Ingots.** Alfred Theis and Karl Nitschke. *Stahl und Eisen,* v. 78, Oct. 2, 1958, p. 1380-1383.

Experiments on 18% Cr, 8% Ni steels performed with usual exothermic feeding powders gave no satisfactory results. Neither did rammed top linings in the nozzle. Weight of top discard could be reduced 50% by the use of pressed exothermic inserts and feeding powder. (D9; ST)

525-D.* **Blast Furnace Bypass.** *Chemical Week,* v. 83, Oct. 11, 1958, p. 82, 84.

Strategic-Udy electric-arc smelting technique results in excellent performance in direct reduction of iron ore. (D8n; Fe)

526-D.* **Bottom-Blow Converter.** Marc Allard. *Iron and Coal Trades Review,* v. 177, Sept. 5, 1958, p. 560-563.

Reviews work done in France on improvement of basic bessemer steelmaking process. Suppression of "slopping" by altering the shape of the vessel, controlling the blast volume, and use of finely-divided lime in the blast to insure quick fluxing of the primary, normally highly siliceous slag. 10 ref. (D3)

527-D.* (Czech.) **Improvement of Openhearth Process by Means of Oxygen.** Ivan Pavlovic Bardin. *Hutnicke Listy,* v. 13, Oct. 1958, p. 863-868.

Consumption of 25 to 35 cu. m. of oxygen per ton of steel increases maximum output of furnaces by 17 to 20% and fuel economy rises from 10 to 15%. Oxygen is injected directly by nozzles placed in roofs of openhearth or arc furnaces. Where steel is produced from pig iron rich in phosphorus, oxygen is injected into the bath. In all cases successful use of oxygen can only be effected if the furnaces have basic roofs. (D2g; *O*)

528-D.* (Czech.) **Use of Oxygen-Enriched Blast in Soviet Blast Furnaces.** M. A. Shapovalov. *Hutnicke Listy,* v. 13, Oct. 1958, p. 872-878.

Use of blast enriched with 27% O_2 in production of foundry pig iron and blast enriched by 25% O_2 for production of openhearth pig iron results in an increase of 20% and 14-15% respectively in productivity, coke consumption remaining the same. Blast enriched by O_2 during production of ferromanganese and ferrosilicon results in similar increases in yield and a reduction in coke consumption.
(D1h, *O*)

529-D.* (German.) **Metallurgy of the Low Shaft Furnace.** Karl-Friedrich Ludemann. *Neue Hütte,* v. 3, Sept. 1958, p. 523-533.

Ores melted in a low-shaft furnace with 1.35 to 22.27% Fe, varying amounts of Mn, P, S, CaO, MgO, SiO_2, Al_2O_3. Composition of iron, (3.5 to 4.2% C, varying amounts of Si, Mn, P, S) of slag and of waste gas obtained. 22 ref.
(D8n, RM-q, *Mn,* Fe)

530-D.* (German.) **Electrometallurgy of Steel.** Franz Sommer. *VDI Zeitschrift,* v. 100, Aug. 1, 1958, p. 1053-1062.

Directly and indirectly heated electric arc furnaces, low-frequency and middle-frequency induction furnaces and resistance furnaces. Required properties of scrap; melting processes; refining; elimination of harmful gases such as carbon monoxide, hydrogen, nitrogen.
(D5, D6; ST)

531-D.* (Russian.) **Equilibrium of the Distribution of Sulphur Between Metal and Slag in the Openhearth Furnace.** L. A. Shvartsman, A. I. Osipov, V. F. Surov, M. L. Sazonov, S. A. Telesov and A. M. Ofengenden. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 599-601.

Sulphur distribution influenced by the ratio of basic and acid compounds contained in the slag. It is advised to decrease the silica in the slag, if possible, during the melting period, and to keep the slag liquid by adding liquefying materials including ferrous oxide.
(D2d, D11n, D11s; S)

532-D.* (Russian.) **Reduction of Iron Oxides Under High Pressure.** A. S. Tumarev and L. A. Panyushin. *Stal'*, v. 18, Sept. 1958, p. 769-776.

Influence of gas pressure on speed of reduction of iron oxides in blast furnace. Grain size of iron ore 1-4 mm., intermittent gas pressure at 1-3 atm. Increased gas pressure accelerates the reduction process of iron oxides by the carbon monoxide (in the kinetic zone). Use of high pressure in blast furnace increases speed and rate of indirect reduction. The higher the velocity of gas flow the greater the influence of gas pressure on the reduction process. (D1, 3-74)

533-D.* (Russian.) **New Designs for Cooling Blast Furnaces.** S. M. Andon'ev, G. A. Kudinov and O. V. Filip'ev. *Stal'*, v. 18, Sept. 1958, p. 776-780.

Experiments conducted with 1033-cu. m. capacity blast furnace on use of a thin-walled furnace shaft with surface plate coolers; vertical plate coolers with cells for crust formation for the boshes; cooling devices of improved design for the lower part of blast furnace; tuyeres and furnace hearth bottom. (D1a, W10f, 1-52)

534-D.* (Russian.) **Advantages of Grading Blast Furnace Burden Materials.** M. A. Shapavalov. *Stal'*, v. 18, Sept. 1958, p. 780-781.

Sifting out of iron ore fines below 6 mm. and grading of ores is most effective means of eliminating the peripheral-axial gas flow, reducing coke consumption and increasing blast furnace productivity. 4 ref. (D1a)

535-D.* (Russian.) **Investigation of Thermal Performance of 500-Ton Openhearth Furnace.** V. S. Kocho, V. I. Grankovskii and E. A. Ploshchenko. *Stal'*, v. 18, Sept. 1958, p. 782-788.

Determination of distribution of heat flow along length of bath, when injecting compressed air into furnace ports. This has made possible determination of optimum thermal conditions for heats. Tests made in basic furnaces with Cr-Mg roofs that had withstood 450 heats. The specific heat consumption for a 500-ton furnace averaged 125 kg. per ton of steel and average length of melt 12.4 hr. 5 ref. (D2h)

536-D.* (Russian.) **Desulphurization of Basic Converter Steel by Top Blowing With Oxygen.** S. I. Lifshits. *Stal'*, v. 18, Sept. 1958, p. 788-793.

Steel made in converter with 20 cu. m. capacity lined with magnesite chromite brick. Oxygen use under 10-14 atm. pressure is from 56.3 to 62.3 cu. m. per ton of steel. Composition of oxygen blown pig is: 0.5% Si, 1.8% Mn, 0.09% P and 0.08% S. Satisfactory results in desulphurization of oxygen-blown converter steel can be obtained only when sulphur content in iron does not exceed 0.07%. To obtain steel from pig containing more than 0.05% sulphur, special melting methods have to be applied. (D11n, D3b)

537-D.* (Russian.) **Melting Stainless Steel From Scrap With Use of Silico-Manganese.** L. I. Teder, V. Ya. Monastyrskii and V. I. Mesyats. *Stal'*, v. 18, Sept. 1958, p. 801-802.

How to reduce cost of stainless steel production. Ferro-alloys constitute 61.5% of steel and their replacement with cheaper substitutes is major goal in cost reduction. Replacement of metallic Mn by silico-manganese under certain conditions does not increase carbon content and results in considerable savings in consumption of low-carbon ferrochromium and ferrosilicon. (D9r; SS, RM-p, AD-n31, Mn)

538-D. Application of Oxygen to Openhearth Furnaces. W. Gerling and K. O. Zimmer. *Iron and Coal Trades Review*, v. 177, Sept. 26, 1958, p. 725-728. (From *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 156-160.)

Previously abstracted from original; see item 125-D, 1958. (D2g; ST)

539-D. Ferromanganese: the Spice of Steel. *Engineer and Foundryman*, v. 23, July 1958, p. 35-37.

Latest types of smelting plant at Cato Ridge, Natal, South Africa. (D5; ST, Mn, AD-n31)

540-D. Does Moisture Control Benefit Blast Furnace Air? C. E. Agnew. *Iron Age*, v. 182, Nov. 6, 1958, p. 114-117.

Examination of opposing theories of drying blast furnace air or adding controlled amounts of moisture. (D1h)

541-D. Extension of the LD Process. Pt. 1. Production of Special Steels. O. Cuscoleca and K. Rosner. *Iron and Coal Trades Review*, v. 177, Aug. 22, 1958, p. 441-448.

Adaptation of the process permits high-carbon and various grades

of alloy steel to be produced. 7 ref. (D10a)

542-D. Extension of the LD Process. Pt. 2. Conversion of High-Phosphorus Iron. *Iron and Coal Trades Review,* v. 177, Aug. 29, 1958, p. 501-507.

Application of process to conversion of irons containing from 0.5 to 1.5% P if a double-slag method of operation is adopted. The second slag formed can be re-used as a first slag on the next heat, and, to tap metal cleanly from under this slag, a special taphole is incorporated in the vessel. 7 ref. (D10a; RM-q)

543-D. Modern Steelmaking Practice. *Iron and Coal Trades Review,* v. 177, Sept. 5, 1958, p. 569-574.

Steelmaking by the duplex process, slag control in the openhearth, role of immersion pyrometry in steel refining, use of basic roofs, were discussed at the 12th Junior Steelmaking Conference of BISRA at L'landudno on June 4th and 5th. (D2, D3, X9r; RM-h38)

544-D. Conversion of Low-Phosphorus Iron. H. Kosmider, A. Weyel and H. Neuhaus. *Iron and Coal Trades Review,* v. 177, Sept. 19, 1958, p. 667-673.

Oxygen-steam "mixed blast" bottom blown converter can be adapted to convert low-phosphorus irons previously unusable. 11 ref. (D3a;RM-n)

545-D. Instrumentation of "Patricia" Blast Furnace No. 3 Fairless Works. W. E. Williams. *ISA Journal,* v. 5, Sept. 1958, p. 94-98.

(D1b, X-general)

546-D. Oxygen Increases Open Hearth Output. *Metallurgia,* v. 58, Oct. 1958, p. 195-196.

Oxygen lancing of openhearth furnaces has led to substantial increase in steel output compared with normal furnaces for approximately the same cost per ingot ton of steel. (D2g)

547-D. Use of Oxygen to Increase Operating Efficiency in the Tropenas Converter. *National Cylinder Gas Information Report,* no. 15, Aug. 1958, 7 p.

O_2 injection provides cleaner metal, permits reduction or elimination of ferrosilicon as a heat source, reduces blowing time and damage to refractories. (D3f; O, CI-a)

548-D. Continuous Casting of Light-Section Steel Billets and Subsequent Cross Rolling Without Process Anneal. A. S. Nikiforov. *Proceedings of First All-Union Conference on Continuous Casting of Steel,* Moscow, Oct. 1955, p. 123-128. (Henry Brutcher, Altadena, Calif., Translation no. 3951.)

Production process for balls used in crushing or grinding mills, based on use of continuous-cast hot billets, gas cut into short lengths and then cross rolled, quenched and tempered. (D9q, W2a, 17-57; ST)

549-D. Withdrawal of Steel and Slag Tap Holes of Openhearth Furnaces. D. I. Kuznetsov. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1957, p. 16-19. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(D2)

550-D. New Methods of Deoxidation and Desulphurization of Steel With Improvement in Its Quality. V. A. Skachko and N. P. Merenkov. *Stal',* v. 17, 1957, p. 521-522. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4047.)

Previously abstracted from original. See item 300-D, 1957. (D9r; ST, *Al*)

551-D. Blast Furnace Performance Improved by Changing the Blast Composition. E. M. Lokshin and Yu. S. Borisov. *Stal',* v. 18, no. 5, 1958, p. 391-397. (Henry Brutcher, Altadena, Calif., Translation no. 4403.)

Previously abstracted from original. See item 323-D, 1958. (D1h, D11k)

552-D. Effect of Vacuum Melting Upon Steel Quality. Ya. M. Bokshitskii. *Stal',* v. 18, no. 6, 1958, p. 520-525. (Henry Brutcher, Altadena, Calif., Translation no. 4405.)

Experimental heats of 27% Cr steel at furnace pressures ranging from 760 down to 0.05 mm. Hg; effect on C, Mn, Si, Cr, P, S and especially O_2 and N_2 contents. Volatilization of Mn; interaction between C and O_2 and S and O_2; extent of degassing by vacuum melting. Impact strength of vacuum melted 27% Cr steel as affected by C content. Tensile and impact properties in forged and heat treated state as function of pressure during melting. (D8m, Q27a, Q6n; ST)

553-D. Structure and Properties of Slags Obtained in Smelting Processes.

Pt. 1. Measurement of the Viscosity of Slags of the Ferrous Oxide-Alumina-Silicic Acid System. P. Rontgen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 5, 1956, p. 207-214. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. CSIRO-3414.)

(D11n; RM-q)

554-D. (German.) **Economic Considerations of the Induction Melting of Iron and Steel.** Karl-Heinz Brokmeier and Walter Lang. *Giesserei,* v. 45, Aug. 14, 1958, p. 465-469.

Operating costs with city frequency and medium-frequency crucible furnaces. (D6, W18a; ST)

555-D. (German.) **Economic Comparison Between Different Steel Production Processes.** Karl F. Tudemann. *Neue Hütte,* v. 3, Aug. 1958, p. 462-474.

Economy of different steel production processes under existing and future conditions in the German Democratic Republic. 15 ref. (D-general, A4)

556-D. (German.) **Pressure Distribution in the Openhearth Furnace.** Vaclav Parma. *Neue Hütte,* v. 3, Sept. 1958, p. 550-553.

Pressure in the hearth space measured in different places and recorded for whole melting process by plotting time curves. Highest average pressure measured at the center of the hearth roof. 13 ref. (D2, 3-74)

557-D. (German.) **Effect of Physical Properties of Coke on the Working of a Blast Furnace.** Werner Himsel. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1225-1229.

(D1; RM-j43)

558-D. (German.) **Mathematics and Statistics of the Blast Furnace Operation Using Characteristic Values.** Volkmar Steinecke. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1229-1235.

Mathematical statistical procedure for evaluating production records and the results of experiments. 17 ref. (D1, S12)

559-D. (Book.) **Advances in Steel Technology in 1956. Prepared by the Secretariat of the Economic Commission for Europe.** 1958. 107 p. United Nations, Geneva. (Available from Columbia University Press, 2960 Broadway, New York 27, N. Y.) $1.

General review of technological developments; six papers dealing with new processes that have reached the stage of industrial application. Papers abstracted separately. (D-general)

560-D. (Book—German.) **Handbook of Continuous Casting.** Erhard Herrmann. 916 p. 1958. Aluminium-Verlag GmbH., Jägerhofstr. 26-29, Düsseldorf, Germany. DM 300.

Review of publications, description of metals and apparatus; application to various metals. (D9q, C5q)

561-D. (Book—Russian.) **Computations on the Composition of Charges for the Scrap-Ore Openhearth Process.** A. M. Bigeev. 196 p. 1957. Metallurgizdat, Sverdlovsk, USSR, 7R 90K.

Chemical processes taking place in the openhearth furnace. Computations on the right quantities of ore, limestone, other nonmetallic additions, deoxidizing and alloying additions. (D2a, D11; RM-n, RM-b, AD)

562-D. (Book-Russian.) **Formation of Slag in the Basic Openhearth Process.** P. V. Umrikhin. 195 p. 1958. Metallurgizdat, Sverdlovsk, USSR, 7R 75K.

Distribution of slag-forming materials in the furnace during the scrap and scrap-ore processes. Significance of the slag in dephosphorization, decarburization and desulphurization and influence on hydrogen content. 119 ref. (D2d, D11n, D11q; RM-q)

563-D. Tula Sverdlosk, Chelyabinsk, Magnitogorsk — Key Russian Steel Plants. Nicholas J. Grant and John Chipman. *Journal of Metals,* v. 10, Mar. 1958, p. 182-185.

Equipment and layout; vacuum ingot degassing and blast furnace practice. (D1, D8m)

564-D. Alloyed Steel in the Ukraine. David Swan. *Journal of Metals,* v. 10, Mar. 1958, p. 185-186.

Electric arc furnace practice. 4 ref. (D5)

565-D. Vacuum Treatment of Steel in the Soviet Union. A. M. Samarin. *Journal of Metals,* v. 10, Mar. 1958, p. 190-192.

4 ref. (D8m)

566-D. Consumable-Electrode Vacuum Arc Melting. Helmut Gruber. *Journal of Metals,* v. 10, Mar. 1958, p. 193-198.

Furnace design; arc control; skull melting and pairing. 17 ref. (D8m)

567-D. New Developments in Steelmaking Processes. D. L. McBride. *Journal of Metals,* v. 10, Apr. 1958, p. 263-267.

Use of oxygen in blast furnace, openhearth and Bessemer converters. 7 ref. (D1h, D2g, D3b)

568-D. Humidified Blast Furnace Operation. Richard J. Wilson. *Journal of Metals,* v. 10, Apr. 1958, p. 268-271.

Operating characteristics of No. 5 blast furnace at Indiana Harbor with higher blast temperatures and added moisture. Benefits attributed to the use of steam were improvement in hearth temperature control and increase in drying rate of the furnace. 4 ref. (D1h, 2-62)

569-D. Carbon Monoxide Reduction of Iron Ore. Otto Stelling. *Journal of Metals,* v. 10, Apr. 1958, p. 290-295.

In a fluidized bed with cementite as the main component traversed by carbon monoxide of relatively high concentration, concentrates are introduced at a temperature below 700° C. After cooling to 300° C. the product is heated to 750° C. or more, and a very rapid reaction takes place with subsequent sintering and formation of metallic iron. (D8j, B15)

570-D. Hot-Metal Pre-Treating Tower. J. M. Gaines and D. C. Hilty. *Journal of Metals,* v. 10, July 1958, p. 452-455.

Subdivision of the iron into small drops in an atmosphere and use of a shot tower. Practically all Si was removed, and C reduced to 2% or less. (D8n)

571-D. Unconventional Iron Smelting Processes. M. O. Holowaty and C. M. Squarcy. *Journal of Metals,* v. 10, July 1958, p. 456-459.

Elliptical blast furnace, direct reduction processes, vertical retort processes, rotary hearth processes and rotating kiln.
(D-general, A2; Fe)

572-D. R-N Direct Reduction Process. Alex Stewart and H. K. Work. *Journal of Metals,* v. 10, July 1958, p. 460-464.

Ore and solid carbonaceous fuel are fed into a rotary kiln at several times the rate of the carbon requirement. Limestone and dolomitic limestone are fed into the kiln to arrest the sulphur in the ore and fuel. As the ore travels through the kiln, countercurrent to the flow of heat, it is dried, preheated and reduced. The product is metallic iron suitable for electric furnace or openhearth feed after compacting. (D8j)

573-D. Vacuum Casting of Steel. J. N. Hornak and M. A. Orehoski. *Journal of Metals,* v. 10, July 1958, p. 471-475.

Vacuum-casting process successfully reduced hydrogen concentration in steels for large forging sections to a level at which the steel is insensitive to flanking. The final hydrogen content of the steel is at a level at which the tensile ductility for aged and unaged specimens is approximately the same. The pressures at which the process is conducted require that special detailed attention be given to the preparation of the equipment and the actual vacuum casting of the steel. (D9s, 1-73; H)

574-D. Thermochemistry of Oxygen Steel. W. O. Philbrook. *Journal of Metals,* v. 10, July 1958, p. 477-482.

Production of steel of low nitrogen content with increased scrap consumption. 20 ref. (D10, P12)

575-D. Exothermic Ferromanganese. W. R. Lewis, R. L. Kimberly, T. V. Wainwright and W. A. Olsen. *Journal of Metals,* v. 10, Sept. 1958, p. 611-614.

Production, results and influence of exothermic practice.
(D-general, C21d; AD-n31, Fe, Mn)

576-D. Iron and Steel in Belgium. Pierre van der Rest. *Journal of Metals,* v. 10, Oct. 1958, p. 654-655.

(D-general)

577-D. Converter Practice at La-Sambre. M. Demarz. *Journal of Metals,* v. 10, Oct. 1958, p. 669-672.

Use of oxygen-steam and oxygen-carbon dioxide blowing to produce low-nitrogen, basic bessemer steel in a Belgian mill. (D3b)

578-D. LD Produces Alloy Steels in Austria. O. Cuscoleca and K. Rosner. *Journal of Metals,* v. 10, Oct. 1958, p. 672-678.

Techniques for applying the LD converter to high-carbon steel production during rail steel manufacture at the Donawitz plant of Oesterreichisch Alpine Montangesellschaft. (D8j)

579-D. Soviet Blast Furnace Practice. J. H. Strassburger. *Journal of Metals,* v. 10, Nov. 1958, p. 721-723.

Blast furnace and sintering operations at the Kuznetsk Works at Stalinsk and the Zaporozhstal plant in the Ukraine. (D1)

580-D. Openhearth Shops of the USSR. K. C. McCutcheon. *Journal of Metals,* v. 10, Nov. 1958, p. 724-726.

Russian practice as witnessed at Chelyabinsk, Magnitogorsk, Kuznetz, in Siberia and at Dneprospetstal and Zaporozhstal in the Ukraine. (D2)

581-D. Direct Iron Ore Reduction. P. E. Cavanagh. *Journal of Metals,* v. 10, Dec. 1958, p. 804-809.

Evaluation of the major commercial processes now in operation. (D8j)

582-D. Equilibrium Between Cerium and Sulfur in Liquid Iron. F. C. Langenberg and J. Chipman. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 290-293.

Solubility power and desulphurizing power of Ce. 8 ref.
(D11n, P12e; Ce-b, *S,* Fe, 14-60)

583-D. Properties and Performance of Continuously Cast Low Carbon Steel Products. M. Tenenbaum, R. N. Edmondson and Logan Mair. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 431-445.

Continuously cast, rimmed and deoxidized steels processed through high-capacity commercial equipment into commodities which were inspected, tested and formed. (D-general, F-general, Q-general, 1-66; CN-g, ST-d, 1-52, 1-61, 17-57)

584-D. Vacuum Melting: Influence of Hydrogen Pretreatment of Crucibles on Oxygen Content of Iron Charges. T. J. Bosworth. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 489-493.

Reduction of O_2 in melts in alumina, magnesia, zirconia crucibles. 8 ref.
(D8m, D8g, 2-66; Fe, *O, H,* 14-60)

SECTION E

FOUNDRY

1-E. New Chevrolet Plant Diecasts Transmission Parts. Kenneth L. Mountain. *Foundry,* v. 85, Nov. 1957, p. 93-97.

(E13)

2-E. Vibration Can Improve Casting Quality. A. H. Freedman, J. F. Wallace and F. A. Carbonaro. *Foundry,* v. 85, Nov. 1957, p. 98-99.

Vibration has beneficial effects in degassing molten metals, grain refinement of solidifying metals and improvement in the detail of castings by an increase in the "apparent fluidity". 9 ref. (E25)

3-E. Close Control Required to Produce Aircraft and Missile Castings. William G. Gude. *Foundry,* v. 85, Nov. 1957, p. 102-105.

Steel foundry practice at Pacific Alloy Engineering Corp., El Cajon, Calif. (E general, T24, 17-57; ST)

4-E. Stainless and Heat-Resistant Investment Castings. R. Taylor. *Foundry Trade Journal,* v. 103, Oct. 24, 1957, p. 483-494.

Precision casting at Firth-Vickers Ltd., Sheffield. Dies, production of wax patterns, soluble wax technique, assembly of patterns, primary investment, boxing, secondary investment, mold drying, dewaxing, firing and casting, effect of alloy composition. (E15; SS, SGA-h)

5-E. Three Foundries in the Irish Republic. V. C. Faulkner. *Foundry Trade Journal,* v. 103, Oct. 24, 1957, p. 497-498.

Hammond Lane, I.V.I. and Tonge and Taggert Foundries.
(E general, 1-52)

6-E. (German.) **Development and Operation of the Hot Blast Cupola Furnace.** Ernst Löbbecke. *Giesserei,* v. 44, Aug. 29, 1957, p. 505-515.

Design of a hot blast cupola; operation of acid hot blast cupolas; hot blast cupolas without linings. 46 ref. (E10a, W18d, 1-52)

7-E. (German.) **Practical Suggestions for Application of Pouring Gates of Exothermic Material in the Steel Foundry.** Karl Reinmann. *Giesserei,* v. 44, Sept. 12, 1957, p. 550-552.

Design of the exothermic gates; savings realized by use of exothermic gates. 16 ref. (E22p, 1-52; ST)

8-E. (German.) **Olivine, a Fireproof Molding Sand.** *Giesserei-Praxis,* v. 75, Sept. 10, 1957, p. 376-378.

History, properties, chemical composition, occurrence, industrial uses, data related to other fireproof materials, advantages as mold, proper mixtures. 2 ref. (E18)

9-E. (German.) **Defects of Overhardened Cast Iron.** Hans Reininger. *Giesserei-Praxis,* v. 75, Sept. 30, 1957, p. 389-394.

Occurrence; characteristics, causes, prevention. (E11; CI, 9)

10-E. (Japanese.) **Studies on Aluminum-Magnesium Casting Alloys.** Masao Kato and Yasuji Nakamura. *University of Tokyo, Report of the Institute of Industrial Science,* Ser. 48, v. 6, Mar. 1957, 49 p.

Causes and remedies for difficulties in manufacturing processes.
(E general; Al, *Mg*)

11-E. A Guide to South African Foundry Mechanisation. H. Godwin. *Engineer and Foundryman,* v. 22, Aug. 1957, p. 44-50.

Examples of mechanization in sand preparation, storage and distribution, molding and casting.
(E11, 18-74)

12-E. (German.) **Sweden's Foundry Industry.** Lars Villner. *Giesserei,* v.

44, Oct. 10, 1957, p. 631-636.
(E general)

13-E. (German.) **Melting of Plain Carbon Steel for Castings in Low-Frequency Induction Crucible Furnaces.** Heinz Rohn. *Giesserei,* v. 44, Oct. 24, 1957, p. 662-665.

Comparison with conventional melting units; metallurgy and economics involved. 5 ref.
(E10r, W18a; ST)

14-E. (German.) **Calculation of the Riser-Neck on Sand Castings.** Richard Namur. *Giesserei,* v. 44, Oct. 24, 1957, p. 665-671.

(E22q)

15-E. (German.) **Selection of Alloys for Die Casting.** W. Wolf. *Metall,* v. 11, Aug. 1957, p. 655-659.

The founder wants suitability for casting while the user looks for good mechanical properties, high accuracy and good surface finish. Zn, Al and Cu alloys constitute a compromise.
(E13; Zn, Al, Cu)

16-E. (Russian.) **Alloying and Modification of Heat Resisting Silicon Cast Iron.** P. I. Durasov and N. N. Aleksandrov. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 42-48.

All samples showed tendency to develop cracks except Si iron with spheroidal graphite alloyed with Mn. 8 ref. (E21; CI-r, *Si*)

17-E. (Russian.) **Horizontal, Centrifugal Casting Machine.** E. M. Petrov and M. T. Evdokimov. *Vestnik Mashinostroeniya,* v. 37, Aug. 1957, p. 33-36.

Design and characteristics of new machine which can handle castings 1000 mm. in diameter, 3500 mm. long and 10-100 mm. thick. (E14, 1-52)

18-E. **How Precision Toolmaking Affects Shell-Molding Success.** Otto W. Winter. *American Machinist,* v. 101, Oct. 21, 1957, p. 139-142.

Special precautions in the cooling of patterns and core boxes for shell molding to counteract thermal effects, mold spreading, collapse or distortion and to provide for gating and stripping. (E19c)

19-E.* **Effect of Aluminium on the Inoculating Power of Ferrosilicon and Its Tendency to Give Pinholing.** J. V. Dawson. *British Cast Iron Research Association Journal of Research and Development,* v. 7, Aug. 1957, p. 2-9.

Effects of varying amounts of Al in ferrosilicon used as an inoculant in nodular graphite cast iron; effects of Al content on inoculating power, pinholing, mechanical properties and eutectic cell count.
(E25q; AD-h, AD-p36, Fe, Si, Al, CI-r)

20-E.* **Preliminary Study of the Mode of Solidification of Chill Test Casting.** I. C. H. Hughes. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Aug. 1957, p. 10-22.

Theoretical aspects of chill and mottle formation for sand and chill test castings; analysis of cooling curves and temperature distributions in solidifying cast iron. Effects of pouring temperature upon chill; formation of mottle and the characteristics of chill test fracture. 6 ref.
(E22r, E25n; CI)

21-E.* **A Note on the Influence of Furnace Holding Time on Chill and Mottle Formation.** J. Rickard. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Aug. 1957, p. 23-26.

Effects of pouring temperature, superheating temperature and furnace holding time on the depth of chill and mottle in chilled cast iron.
(E22r; CI)

22-E.* **Application of Sodium Silicates for Bonding Sands.** F. W. Nield and D. Epstein. *British Foundryman,* v. 50, Sept. 1957, p. 457-465.

Bond produced by passing carbon dioxide through test pieces of silicate sand containing as bonding agents sodium silicate with ratio of silicon dioxide to sodium oxide of 2.0, 2.5, 2.9 or 3.3; relationships between compression strength and gassing time, temperature and bonding solids. 4 ref. (E18n)

23-E.* **Improvements in Surface Finish, Inspection, and Fettling of Grey-Iron Castings.** L. Clarke. *British Foundryman,* v. 50, Nov. 1957, p. 539-551.

Design, patterns, sands, gating additions, washes, shot-blasting and controlled heat treatment; inspection of castings, gaging, hardness testing, crack detection and gamma ray tests; reduced fettling, standard gating and feeding methods.
(E11, S general; CI-n)

24-E.* **Some Observations on Cupola Tapping.** F. D. Roper. *British Foundryman,* v. 50, Nov. 1957, p. 553-556.

Operations entailed in intermittent tapping from cupolas. The tap-hole; its preparation, size, material used; shape of the tap-hole and its in-

fluence on actual tapping operations. Botting materials and the technique of botting-up. (E10a, 1-52)

25-E. Operating Experience With a Hot-Blast Cupola Plant. J. J. Sheehan and G. J. Shaw. *British Foundryman,* v. 50, Nov. 1957, p. 556-562.

Design of plant; recuperator, instrumentation; principles of operation; operating performance; melting rate; metal control; cork and fluxes; metal structure and labor requirements. (E10a, W18d)

26-E.* Effect of Design Variables Upon Shrinkage Defects Under Bosses on Thin Plates. A. G. Fuller. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Oct. 1957, p. 54-67.

Effect of variation in plate thickness, boss size, "gating ratio", and the position of the sprue relative to the casting, upon sinking beneath bosses on thin plates. Results on the basis of metal flow and temperature conditions within the casting. Sinking increases when conditions are such that the heat content of the metal filling the mold is increased. 8 ref. (E22; CI)

27-E.* Inverse Greyness in Malleable Cast Iron. C. T. Moore. *British Cast Iron Research Association, Journal of Research and Development,* v. 15, Dec. 1957, p. 68-79.

Preliminary investigation of inverse grayness occurring in certain types of commercially produced blackheart malleable castings, factors affecting the incidence of this defect in thin sections attached to a relatively heavier section of a test casting. Inverse grayness was found to increase simultaneously with mottle in the heavy section when the Al, Si, C or Mn content was increased. High casting temperatures and an increase in the thickness of the thin section also aggravated the defect. 3 ref. (E25q; CI-s)

28-E.* Carbon Pick-Up in the Cupola. Michael Perch and Charles C. Russell. *Foundry,* v. 85, Dec. 1957, p. 70-75.

Ash value of coke, or its major constituent, Si, has a significant inhibiting effect on C solubility in Fe. The type of Fe also seems to be important to the amount of C pick-up. 10 ref. (E10a; RM-j43)

29-E. Mold-Metal Interface Reactions. Howard F. Taylor and José Navarro. *Foundry,* v. 85, Dec. 1957, p. 76-80.

Theory for interface control which is basic enough to explain observed phenomena in the fields of investment casting, conventional sand mold processes and metal oxidation. 10 ref. (E11, E15, E19, M27F)

30-E.* Shrinkage in Tin Bronze Castings. Clyde L. Frear. *Foundry,* v. 85, Dec. 1957, p. 81-85.

Behavior of Sn bronzes; causes of defects such as cavities, shrinkage and leakages; solidification characteristics; types of dendrites, formation. 3 ref. (To be continued.) (E25n; Cu-s, *Sn,* 9-68)

31-E.* How to Make Epoxy Patterns and Coreboxes. Joseph W. Tierney. *Foundry,* v. 85, Dec. 1957, p. 86-90.

Epoxy plastic tooling technique is a duplicating process. The mold usually is of plaster or of epoxy material, made from a pattern or model of the part. From this mold, many epoxy patterns or coreboxes can be made in a fraction of time otherwise required to make a duplicate pattern. (E17, E21; NM-d)

32-E. "Slagging" of Cupolas. *Foundry Trade Journal,* v. 103, Oct. 31, 1957, p. 513-515.

Slag handling and disposal. (E10a; RM-q)

33-E. Czech Foundry Developments. Further Research in CO_2 Practice. *Foundry Trade Journal,* v. 103, Oct. 31, 1957, p. 518-520.

Abstracts of three articles contained in a booklet entitled "Progressive Methods in the Foundry" issued by the Czech Research Institute for Materials and Technology. (E18)

34-E.* Plaster Moulding of Beryllium Bronze. Louis Grand. *Foundry Trade Journal,* v. 103, Nov. 14, 1957, p. 573-576.

Benefits desired from substituting plaster for molding sand are improved surface finish, enabling the impression to be polished without machining and filing; and an increase in the fineness of pattern detail due to the low thermal conductivity of plaster. (E16a; Cu, *Be*)

35-E. Systematic Control Guides Production of High Quality Gray Iron Castings. A. W. Schneble. *Industrial Heating,* v. 24, Sept. 1957, p. 1860-1872.

Sand preparation and handling; control in molding and coremaking, melting practice control. (E11, E18; CI-n)

36-E. Manufacture and Use of Large Aluminum Die Castings. D. A. Bauer. *Machinery (London),* v. 91, Sept. 27, 1957, p. 757-762.

(E13; Al, ST)

37-E. Design of Die-Castings. Pt. 4. Determination of Tolerances. H. K. Barton. *Metal Industry,* v. 91, Nov. 15, 1957, p. 419, 424.

(E13, 17-51)

38-E. Cast Titanium and Zirconium Parts. S. M. Shelton. *Precision Metal Molding,* v. 15, Nov. 1957, p. 48-49, 110-112. (CMA)

Castings are most successfully produced by consumable electrode vacuum melting and pouring into graphite molds. (E12, E10r; Ti, Zr, 5-63)

39-E. Investment Caster Uses Vacuum. *Steel,* v. 141, Nov. 25, 1957, p. 96-98.

Austenal Inc. uses Ni-base alloys for gas turbine blades on production line operation. (E15, 1-73; Ni)

40-E. Casts 150 Engine Blocks an Hour. *Steel,* v. 141, Dec. 2, 1957, p. 122-124.

Automated line at Pontiac's foundry built around two indexable molding machines. (E19, 1-52, 1-61; ST)

41-E. (Dutch.) **Visit to the Foundry Institutes in Denmark, Sweden and Norway.** Gieterij Centrum. *Gieterij-Centrum Berichten,* v. 5, Sept. 1957, p. 49-52.

Exchange of ideas and comparison of operational conditions. Comparative production figures, including Finland (which was not visited). The Technological Institute in Copenhagen has a training foundry supported by the industry. The Metal Institute in Stockholm pays much attention to synthetic sand. The Foundry Section of the Technological Institute in Oslo is in the beginning stage. (E general, A9)

42-E. (French.) **Core Racks.** J. Léonard. *La Fonderie Belge,* no. 10, Oct. 1957, p. 242-246.

List of defects caused by wrong arrangement of cores or by ignorance of properties of core racks; mechanical tests on racks. (E-21, W19g)

43-E. (German.) **Foundry Sand Testing.** Jules Kistler. *Giesserei Praxis,* v. 75, Oct. 10, 1957, p. 429-435.

Purpose; permeability; fineness; mechanical and physical properties; fire resistance; moisture content. (E18)

44-E. (Japanese.) **Gases in Cast Iron.** S. Ikeda, H. Iwanaga and Y. Ono. *Casting Institute of Japan, Journal,* v. 29, July 1957, p. 499-507.

Casting defects due to nitrogen in molten Fe; effect of K_3Fe (Cn)6, Fe_2O_3, SiO, Fe-Si and Al in molten iron. (E11; CI, *Si, Al*)

45-E. (Japanese.) **Influence of Height of Test Piece on Properties of Molding Sands.** Kenji Hashimoto. *Casting Institute of Japan, Journal,* v. 29, July 1957, p. 522-527.

Permeability is not influenced by the height, top hardness increases linearly; ramming energy necessary to mold a test piece increases proportionally by height, and compression strength is inversely proportional to height. (E18r)

46-E. (Japanese.) **Semi-Continuous Casting of Aluminum.** Shigeo Muromachi. *Light Metals,* v. 7, July 1957, p. 6-27.

Fundamental experiments on segregation in Al alloys; studies on semicontinuous casting. 45 ref. (E25n, C5q; Al)

47-E. (Japanese.) **Shrinkage Coefficent and Deformation of Die and Gravity Castings. Pt. 7.** Tomonobu Kanno and Torazo Uehara. *Light Metals,* v. 7, July 1957, p. 69-74.

Formula for production of castings with desired shape. (E13, E11, E25q; 5-61)

48-E. (Book-French.) **Metals and Process Alloys Used in Ferrous Metal Casting.** Prepared by Centre Technique des Industries de la Fonderie (Foundry Industries' Scientific Center). 106 p. 1957. Editions Techniques des Industries de la Fonderie, 12 Av. Raphael, Paris, (16e) France. 1800 F.

Handbook for founders. Principal metals and their applications, reasons for use of alloys, alloying equipment. Lists of French suppliers of raw materials for ferrous metal foundries. Appendix covers standard specifications used in U. S., chemical analyses, fusion ranges and densities of ferro-alloys, physical properties of principal metals, chapter on pearlite, characteristic diagrams. (E general; ST, CI)

49-E. Sands for Moulding. *Mechanical World and Engineering Record,* v. 137, Sept. 1957, p. 417-418.

Molding sand properties, their effect on the production of satisfactory cast parts; types of defects associated with unsuitable sands. (E18)

50-E. (German.) **Foundry Practice.** C. Stieler. *VDI Zeitschrift,* v. 99, Aug. 1957, p. 1195-1196.

Literature review. 19 ref. (E general)

51-E. (Italian.) **What Process Shall We Use for Core Making?** *Fonderia,* v. 6, Sept. 1957, p. 381-385.

Advantages and disadvantages of conventional, shell-molding and CO_2 processes, and of method involving use of self-drying binders. (E21g)

52-E.* (Italian.) **Carburization and Decarburization in Industrial Frequency Induction Furnaces.** Elio Calamari. *Fonderia Italiana,* v. 6, Oct. 1957, p. 403-406.

Operational details of carburization and decarburization of ferrous alloys during melting in laboratory and shop installations of low-frequency induction furnaces. (E10b, W18a; CI)

53-E. (Italian.) **Mechanization in Small Foundries.** *Fonderia,* v. 6, Oct. 1957, p. 425-430.

Goals and equipment for gradual mechanization. Mechanization in small foundries should be synonomous with organization of work and simplicity of installations; mechanization in Italian foundries does not necessarily mean the same thing qualitatively and quantitatively as in the more highly industrialized U. S. (E general, 18-74)

54-E. (Russian.) **Casting Tool Blanks in Shell Molds.** Ya. I. Briskin. *Stanki i Instrument,* v. 28, June 1957, p. 22-24.

(E19c)

55-E.* Factors Affecting the Surface Finish of Steel Castings. David V. Atterton. *Foundry,* v. 86, Jan. 1958, p. 78-83.

Research into burnt-on sand. The effective radius of the pores between sand grains varies widely in the foundry and depends on numerous factors, including fineness of the sand, its grading, binder content, degree of compaction, sintering temperature, presence of fusible materials such as metallic oxides, and mold and core dressings of a wide variety. 17 ref. (To be continued.) (E18r; ST)

56-E.* Shrinkage in Tin Bronze. Pt. 2. Clyde L. Frear. *Foundry,* v. 86, Jan. 1958, p. 84-88.

Dissolved gases in melts, with special reference to hydrogen; method of preventing gas pick-up; deoxidation practice. (To be continued.) (E25s; Cu-s, *Sn*)

57-E. Efficient Cupola Operation. T. H. Burke. *Foundry,* v. 86, Jan. 1958, p. 89-93.

Linings, coke, chill tests, fluxes, tuyeres, desulphurization, inoculation and factors affecting chill values. (E10a, W18d)

58-E.* Controlling the CO_2 Process. F. L. Turk, J. J. Gutwald and R. P. Lanz. *Foundry,* v. 86, Jan. 1958, p. 94-97.

Variables investigated include types of sand; proprietary sodium silicate binders; sand mixtures; gassing time; methods of mixing CO_2 sand; variations in carbon dioxide gas, and parting agents. (E18)

59-E. Permanent Mold Casting of Aluminum at the Maytag Co. C. B. Curtis. *Foundry,* v. 86, Jan. 1958, p. 98-102.

(E12, Al)

60-E. Recent Developments in the Manufacture of Castings. Pt. 1. J. L. Rice, R. W. Ruddle and P. A. Russell. *Foundry Trade Journal,* v. 103, Dec. 5, 1957, p. 665-672.

Post-war developments in established foundry practice and in the alloys used for castings. Present status of the various methods, mold production techniques, die-casting developments, shell-molding process. (E general)

61-E. Preview of Ford's New Works—Thames Foundry at Dagenham Nearing Completion. *Foundry Trade Journal,* v. 103, Dec. 5, 1957, p. 673-676.

(E general, 18-67)

62-E.* Recent Developments in the Manufacture of Castings. Pt. 2. J. L. Rice, R. W. Ruddle and P. A. Russell. *Foundry Trade Journal,* v. 103, Dec. 12, 1957, p. 693-702.

Nature and significance of the CO_2 process, precision investment castings, the Shaw process and other techniques. Review of alloy development with reference to gray, malleable irons and spheroidal graphite irons, Cu and Al alloys. (To be continued.) (E general; CI, Cu, Al)

63-E.* Application of Statistical Control in the Production of Precision Castings. V. diSambuy. *Foundry Trade Journal,* v. 103, Dec. 26, 1957, p. 753-756, 758.

Results of experiments carried out in Italian foundry. Standard deviations of the wax-injection and metal casting processes; problem of tolerances in investment castings. (E15, S12)

64-E. New Coring Method Broadens Uses of Light Metal Castings. John L. Everhart. *Materials in Design Engineering,* v. 46, Dec. 1957, p. 102-105.

Introduction of small-diameter intricate passages into sand-cast Mg and Al alloys. Proper design can result in savings in weight, space and machining time. (E21; Mg, Al)

65-E. Design of Die-Castings. Pt. 4. Determination of Tolerances. H. K. Barton. *Metal Industry,* v. 91, Nov. 8, 1957, p. 397-399.

(E13, 17-51, 17-55)

66-E. Design of Die-Castings. Pt. 5. Wall Thicknesses. H. K. Barton. *Metal Industry,* v. 91, Dec. 6, 1957, p. 477-480.

(To be continued.) (E13, 17-51)

67-E. (Dutch.) **Compressive Strength of Molding and Core-Sand With Waterglass as a Binder.** H. G. Levelink. *Metalen,* v. 12, Oct. 31, 1957, p. 406-412.

Strength is a function of time of CO_2 and air exposure. (E18n)

68-E. (German.) **Evaluation of Molding.** Hans Jungbluth. *Giesserei,* v. 44, Nov. 7, 1957, p. 681-694.

Break-up curves; ramming tests; sand triangle. 22 ref. (E18, E19)

69-E. (Japanese.) **Vacuum Melting of Various Pig Irons.** Isao Aoki and Tomojiro Tottori. *Casting Institute of Japan, Journal,* v. 29, Sept. 1957, p. 627-631.

Pig irons of different chemical composition showed accelerated precipitation of eutectic graphite, decrease in amounts of Mn, S, Cu and Sn. Graphite nodulization depends on composition. 5 ref. (E10b, 1-73; CI-a, CI-r)

70-E. (Japanese.) **Gasses in Cast Iron. Report No. 2.** Shigeru Ikeda, Hiroshi Iwanaga and Hiroshi Ono. *Casting Institute of Japan, Journal,* v. 29, Sept. 1957, p. 631-637.

Casting defects due to nitrogen in molten iron and the mechanism of their formation. 7 ref. (E25s, 9; CI)

71-E. (Japanese.) **Results of Fundamental Studies on Foundry Sand in Kawaguchi. Report No. 1.** Eüchi Matsumura. *Casting Institute of Japan, Journal,* v. 29, Sept. 1957, p. 643-648.

(E18)

72-E. (Japanese.) **Research on Cast Iron Treated With Calcium. Report No. 1. Effect on Molten Iron.** Masuteru Maruyama and Akira Watanabe. *Casting Institute of Japan, Journal,* v. 29, Oct. 1957, p. 694-702.

10 ref. (E25q; *Ca,* CI-r)

73-E. (Japanese.) **Study on Cupola Tuyeres. Report No. 3.** Kiyoshi Ishikawa, Ichiro Saeda and Toshio Suzuki. *Casting Institute of Japan, Journal,* v. 29, Oct. 1957, p. 702-707.

With projecting water-cooled tuyeres, blast pressure requirement is lowered, clogging tendency is reduced, and penetration is improved. 3 ref. (E10a, W18d)

74-E. (Japanese.) **Green Sand for Steel Casting. Report No. 5.** Hideo Mikashima and Toshiro Owadano. *Casting Institute of Japan, Journal,* v. 29, Oct. 1957, p. 711-715.

Color adsorption tests. 3 ref. (E18r)

75-E. (Japanese.) **Study on Silica Molding Sand. Report No. 2.** Umeji Harada and Keizo Nishiyama. *Casting Institute of Japan, Journal,* v. 29, Oct. 1957, p. 715-721.

Heating characteristics of four different foundry silica sands. 6 ref. (E18)

76-E. Methods Engineering, With Emphasis on Flow Process-Control Applied to Fettling Shops. F. Gaiger and R. Hancox. *British Foundryman,* v. 50, Dec. 1957, p. 589-596.

(E24, A5)

77-E.* Production of S. G. Iron by the Nickel-Magnesium Process. W. A. Potter. *British Foundryman,* v. 50, Dec. 1957, p. 597-601.

A high-carbon, low-phosphorus iron is essential and it is desirable that Mn and S should also be kept low. For the Mg process, the iron may be hypo or hypereutectic and the C equivalent value may thus lie over a wide range. Generally, the high-carbon irons are better, but in heavy castings there will be some segregation of the graphite spheroids if the iron is hypereutectic. (E25q; CI-r)

78-E.* Experiments on the Effect of Atmospheric Pressure on Top Feeding Heads. A. Pearson. *British*

Foundryman, v. 50, Dec. 1957, p. 601-604.

Experiments were designed to ascertain whether hot spots could be counteracted by the positive introduction of atmospheric pressure to the top feeding head, as many top heads freeze over, resulting in partial vacuum in the shrinkage cavity. All results were checked by radiography. Steel tested analyzed 0.17-0.020% C, 0.3-0.4% Si, 0.5-0.7% Mn. (E23, E25n; ST)

79-E.* Improved Technique for Determining the Porosity of Cast Specimens. R. W. Ruddle. *British Foundryman,* v. 50, Dec. 1957, p. 605-615.

Rapid and accurate porosity determinations both for research purposes and for analysis of melt quality in works control. Apparatus, testing procedure and method of computing results. 3 ref. (E25q, P10m, 1-53)

80-E. Application of the CO_2 Process in the Production of Steel Castings. I. Rees. *Foundry Trade Journal,* v. 103, Dec. 19, 1957, p. 723-726.

Practice at Glanmorfa Ltd. (E11, E18, W19g; ST)

81-E. Recent Developments in the Manufacture of Castings. Pt. 3. J. L. Rice, R. W. Ruddle and P. A. Russell. *Foundry Trade Journal,* v. 103, Dec. 19, 1957, p. 729-735.

Magnesium foundry practice. 100 ref. (E general; Mg)

82-E.* Magnesium Precision Castings Open New Production Potential. L. H. McCreery. *Light Metal Age,* v. 15, Dec. 1957, p. 28-30.

Patterns, molds, testing, inspection, drawing practices; suggestions for control from the foundryman's viewpoint. (E15; Mg)

83-E. Design of Die-Castings. Pt. 5. Wall Thicknesses. H. K. Barton. *Metal Industry,* v. 91, Dec. 13, 1957, p. 502-504.

(E13; 17-51)

84-E.* Die Casting. Gustav Lieby. *Modern Castings,* v. 32, Dec. 1957, p. 35-46.

Advantages, machines, alloys and their properties, die-casting design and alternative methods such as sand and permanent molds. (E13, 1-52)

85-E. Fiat. George W. Cannon, Sr. *Modern Castings,* v. 32, Dec. 1957, p. 47-49.

Foundry practice at the Fiat plant, Turin, Italy. (E general, T21)

86-E. Stop-Look-Listen Before You Try Shell Molding. Arthur Woods. *Modern Castings,* v. 32, Dec. 1957, p. 50-54.

European experiences in designing pattern plates, gating and risering, curing, joining, coremaking as well as stack molding. (E19c)

87-E. D Molds Make Precise Steel Castings. *Steel,* v. 141, Nov. 11, 1957, p. 110-113.

Dietert shell mold process used by a Texas foundry to produce carbon and low-alloy steel castings with close tolerances and smooth surfaces. (E16c; ST)

88-E. Precision Investment Cast Tensile Tests of Low Alloy Steel. J. F. Wallace and I. Berman. Watertown Arsenal. *U. S. Office of Technical Services,* PB 131120, Sept. 1949, 49 p. $1.25.

A precision investment casting technique for casting a sound, low-alloy, 357-in. diameter tensile steel bar capable of predicting the optimum properties of a heat of steel. (E15, Q27; AY)

89-E. (German.) **Iron Cores in East Germany.** Hermann Wesner and Wolfgang Probst. *Giessereitechnik,* v. 3, Aug. 1957, p. 169-172.

Raw material, coatings, manufacture, shapes and dimensions, storage and transportation, need of standards. 2 ref. (E21; CI)

90-E. (German.) **Surface Defects in Steel Castings.** Fritz Brunn. *Giessereitechnik,* v. 3, Aug. 1957, p. 172-173.

Molds made of suitable material eliminate defects in production. (E21; ST, 9-71)

91-E. (German.) **Proper Design for Castings.** Herbert Klotz. *Giessereitechnik,* v. 3, Aug. 1957, p. 174-178.

Comparative demonstration of old techniques versus new suggestions. (E general, 17-51)

92-E. (German.) **Suggestions to Improve Mold Accessory Equipment.** Heinz Lucas. *Giessereitechnik,* v. 3, Aug. 1957, p. 180-182.

Suitable ejector mechanism; clamping; steam lines; need of specifications. (E19, W19m, 1-52)

93-E. (German.) **Purpose and Effect of the Riser.** Werner Tenner. *Giessereitechnik,* v. 3, Aug. 1957, p. 186-188. (E22q)

94-E. (Russian.) **Technological Processes and Mechanization of Heavy, Cast Iron Machine Parts in "Kolomensk" Plant for Heavy Machinery Construction.** B. V. Knorre. *Liteinoe Proizvodstvo,* no. 9, Sept. 1957, p. 4-11.

Casting technique for machine parts 85 tons in weight and 15 meters long. (E general; CI)

95-E. (Russian.) **Cast Iron With Magnesium.** S. F. Gorbunov and M. M. Levitan. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 8-10.
(E25q; CI-r, *Mg,* AD-p37)

96-E. (Russian.) **Production of Large, Cast Iron Machine Parts Using Forced Air Cooled Molds.** I. V. Mitichev, *Liteinoe Proizvodstvo,* no. 9, Sept. 1957, p. 11-16.
(E general, W19g; CI)

97-E. (Russian.) **Control and Adjustment of Basic Process of Cupola Melting.** N. L. Sobol. *Liteinoe Proizvodstvo,* no. 9, Sept. 1957, p. 16-19.
(E10a)

98-E. (Russian.) **Magnesium Modification of Pig Iron of Low Sulphur Content Melted in a Basic Cupola.** G. I. Kletskin. *Liteinoe Proizvodstvo,* no. 9, Sept. 1957, p. 21-26.

Method of introducing Mg into pig iron; influence of sulphur contents upon Mg addition effect; characteristics of the cupola and the basic lining; optimum conditions for basic melting. (E10a; CIa, Mg, AD-a)

99-E. (Russian.) **Experimental Application of Quick-Hardening Binding Materials to Fast Preparation of Casting Molds and Cores.** V. A. Sokolova. *Liteinoe Proizvodstvo,* no. 9, Sept. 1957, p. 26-30.

Application of water glass and special hardeners in sand technology. (E18n)

100-E. (Russian.) **Main Paths of Progress of Soviet Foundry Industry.** *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 1-4.
(E general)

101-E. (Russian.) **Operation of Furnaces With Regulated Selection of Gases Through Forehearth.** G. G. Shepel. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 5-8.

Iron casting methods used in small foundries manufacturing spare parts, so as to enhance the alloying, antifriction and toughening qualities of product. (E10; CI)

102-E. (Russian.) **Densification of Ingot Molds Through Compression, Vibro-Compression and Vibration.** L. E. Komarov. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 10-15.

Method is applicable to ingot molds of most varied dimensions and configurations. (E11, W19c, 17-57; CI)

103-E. Nonmetallic Inclusions in Magnesium Iron. A. E. Krivoschev and I. E. Lev. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 18-20. (Henry Brutcher, Altadena, Calif., Translation no. 4094.)

Desulphurizing effect of Mg in cast iron.
(E general, 9-69; AD-a, *Mg,* CI)

104-E.* (Spanish.) **Production of Low-Carbon Steel Parts by the Shell Molding Process.** Jose M. Navarro and Howard F. Taylor. *Instituto del Hierro y del Acero,* v. 10, July-Sept. 1957, p. 253-277.

Influence of system of runners and sprues on surface defects in low-carbon steel parts; effect of chemical additions. Parts of 2.5 cm. section were found to be more sensitive to pouring speed and location of gates than parts of 1.25 cm. section. Addition of sodium, potassium and calcium carbonates to molds greatly improved surface quality of parts not thicker than 1.25 cm. Shell molds containing inorganic binders produced parts free of surface defects. 7 ref. (E19c, E22; 9-71; CN-g)

105-E. Shell Cores for High Production. *Canadian Metalworking,* v. 20, Nov. 1957, p. 37-38.

Introduction of plastic coated, blown shells, which provide an improved internal finish and detail of castings, is making baked solid cores obsolete for production runs.
(E19c, E21g)

106-E.* **Compressed-Air Risers.** D. R. Kononow. *Iron and Steel,* v. 30, Oct. 1957, p. 489-491.

Application of compressed air to riser feeding of steel and gray iron castings. Effects on casting yield, tensile properties, impact properties, elongation and reduction of area of castings; dimensions and pressure for risers.
(E22q, Q general, ST, CI-n)

107-E.* **Literature Review of Metal Penetration.** A. E. Murton and S. L. Gertsman. *Modern Castings,* v. 33, *American Foundrymen's Society, Preprint No. 58-12,* Jan. 1958, p. 37-42.

Five investigations of metal penetration into foundry molds and cores indicate that an absolute remedy has not been found but good foundry practices minimize the problem. 13 ref. (E11, E18)

108-E.* **Hot Deformation of Molding Sand.** H. W. Dietert and T. E. Barlow. *Modern Castings,* v. 33, *American Foundrymen's Society, Preprint No. 58-6,* Jan. 1958, p. 43-47.

Study of the deformation of sand as it is heated by molten metal.

Means of measuring hot deformation, the use of these measurements, methods for increasing rate of deformation. (E18r)

109-E. New Foundry Sand. Gilbert S. Schaller. *Modern Metals,* v. 13, Oct. 1957, p. 82-86.

Production of 85,000 castings per month from Alcan No. 135 and Alcan No. 236 Al alloys with molds of Northwest olivine. Advantages of olivine over silica as molding sands. (E18; Al)

110-E. (Russian.) **Progress and Perspective of Steel Casting Production in Heavy Machine Construction.** I. R. Kryanin and P. F. Vasilevskii. *Vestnik Mashinostroeniya,* v. 37, Dec. 1957, p. 28-32.

(E general; ST)

111-E.* Effect of the Size of K-Bar Test Castings on Their Shrinkage Defects. T. J. Szajda. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 110-128.

Influence of the size of K-bar test castings and of the pouring temperature in the range 1415 to 1470° C. upon the occurrence and location of a number of shrinkage defects. Maximum drawing occurred at a pouring temperature of about 1450° C. As the pouring temperature decreased over the range 1450 to 1415° C., draws were replaced by sinks. A criterion for estimating the severity of shrinkage defects on the basis of their location and frequency of occurrence at different positions in the test casting is also suggested. 4 ref. (E25n, 1-54; 9-68)

112-E. Foundry Industry in Sweden. Lars Villner. *Castings,* v. 3, Oct. 1957, p. 22-33.

(E general)

113-E. An Aluminum Casting With a Guarantee. *Design Engineering,* v. 3, Dec. 1957, p. 49.

New process which raises tensile strength to 38,000 psi., yield strength 27,000 psi. and elongation 5%, thus making possible many new uses for Al investment castings. (E15; Al)

114-E. Injection of Swarf Into the Cupola. S. H. Chrobok. *Engineer,* v. 22, Oct. 1957, p. 48-55.

Techniques for melting scrap. (E10a; CI, RM-p)

115-E. Forty Years in and Around Foundries. W. L. Hardy. *Foundry Trade Journal,* v. 104, Jan. 2, 1958, p. 3-10.

Critical assessment in which earlier methods of coremaking, molding, metal melting and pouring are summarized and compared with modern techniques. (E11)

116-E. Austenitic Manganese-Steel Technology in an Australian Foundry. Hedley Thomas. *Foundry Trade Journal,* v. 104, Jan. 2, 1958, p. 11-14.

Melting, pouring, molds and cores, heat treatment, chemical control, physical testing, metallography and methods of Mn determination. (E11, *Mn,* SS-e)

117-E. Ford's New Foundry. *Iron and Steel,* v. 31, Jan. 1958, p. 15-17.

Design of new "Thames" foundry at Dagenham, Essex, England. (E general, A5)

118-E. Die Casting Practice at the Works of Metal Castings, Ltd. *Machinery,* v. 91, Dec. 27, 1957, p. 1507-1516.

(E13)

119-E.* Review of Die Casting Practices Abroad. Donald L. Colwell. *Metal Progress,* v. 73, Jan. 1958, p. 88-90.

European Al die castings are made in proportionately higher tonnage than Zn; in both kinds the chemical specifications are higher than in America. Aluminum castings with silicon-free surfaces, capable of anodizing and coloring, are sought on both sides of the ocean. (E13; Al, Zn)

120-E. Precision Toolmaking Aids Shell-Molding. Otto W. Winter. *Metalworking Production,* v. 101, Nov. 29, 1957, p. 2133-2137.

Patterns and core boxes (thermodies) perform at 500° F. and perform a heat transfer function. (E19c, 2-61)

121-E. (French.) **Casting of Copper Alloys in Chill Molds.** Maurice Billing. *Fonderie,* v. 140, Sept. 1957, p. 391-397.

The casting of Cu alloys in chill molds results in lower costs, better dimensional accuracy and finer structure. Cu-Al alloys, brasses and tin bronzes are cast. The chill molds are made of pearlitic cast iron. Feeding of the mold and temperature of casting. Brass used in chill molds is cheap because purity is not too important. A Cu content of only 61% is necessary. Control of composition; difficulties and remedies. 10 ref. (E22r; Cu)

122-E. (French.) **Use and Preparation of Resin Pretreated Sand in Shell Molding.** A. Woods. *Fonderie Belge,* Nov. 1957, p. 269-273.

Advantage of resin; raw materials. (E19c, E18n; NM-d34)

123-E. (French.) **Description of Three Small Foundries for Gray Cast Iron. Pt. 2.** *Fonderie Belge,* Nov. 1957, p. 274-281, 290.

Description of the foundries; productivity; details of the processes used. (E general, 18-67; CI-n)

124-E. (French.) **Modernization of Foundries.** A. Plesinger. *Fonderie Belge,* Nov. 1957, p. 285-289.

Two factors of productivity are studied: substitution of manual work by mechanical operations and organization of molding areas. (To be continued.)
(E general, W19, 18-67, 18-74)

125-E. (German.) **Use of Zircon Sand in Producing Large Steel Castings.** F. Paschke. *Giesserei-Praxis,* v. 75, Oct. 1957, p. 456-459.

(E10, E18; ST)

126-E. (German.) **Basic Hot Blast Cupola Furnace in the Iron Foundry.** *Giesserei-Praxis,* v. 75, Oct. 1957, p. 460-462.

Equipment and operations in gray cast iron foundries.
(E10a, 1-52; CI-n)

127-E. (German.) **Chill Molds for Circular Light Metal Parts.** Ernst Brunhuber. *Giesserei-Praxis,* v. 75, Oct. 25, 1957, p. 464-466.

Construction and operation of multiple part molds. (E22r)

128-E. (German.) **Manufacture of Heavy Section Castings.** Ferdinand Löwe. *Giessereitechnik,* v. 3, Oct. 1957, p. 219-221.

Heating walls of risers affect vacuum action causing flow toward solidifying casting. (E25n, E22q)

129-E. (German.) **Design and Casting Quality.** Herbert Klotz. *Giessereitechnik,* v. 3, Oct. 1957, p. 221-225.

Reduction of tearing of cast iron by new design and placing of core parts. (E11, 17-51; CI)

130-E. (German.) **Recent Developments in the Field of Malleable Castings.** Karl Roesch. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1747-1751.

Production of blackheart and whiteheart malleable iron; effects of melting, chemical composition and heat treatment on structure and mechanical properties. Modern gas annealing plants. 13 ref.
(E general, J23b, CI-s)

131-E. (Swedish.) **The Carbon Dioxide Process.** D. V. Atterton. *Gjuteriet,* v. 47, Oct. 1957, p. 157-166. 12 ref. (E18n)

132-E. (Swedish.) **Development of High Duty Malleable Cast Iron.** Bertil Thyberg. *Gjuteriet,* v. 47, Nov. 1957, p. 179-188.

Pearlitic malleable iron of higher tensile strength, improved yield point and elongation; possibilities for hardening. 9 ref.
(E general, J28; CI-s)

133-E. (Swedish.) **Swelling of Wooden Patterns.** Lars Lange. *Gjuteriet,* v. 47, Nov. 1957, p. 189-192.

Dimension changes caused by various storage practices and foundry defects resulting. (E17, E19, 9)

134-E. (Japanese.) **Quality Improvement in Die Casting.** Hiroshi Asada, Tomonobu Kanno, Kazuo Matsushita and Jiro Wada. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 55-63.

Temperature control, variation of die-temperature distribution. 3 ref.
(E13, W19n)

135-E. (Japanese.) **Solidification of Pure Aluminum. Pt. 5.** Yoshinobu Nakao. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 5-15.

Effects of Ti on the cast structure solidified under various cooling conditions. 12 ref.
(E25n, N12, Al-a, *Ti)*

136-E. (Japanese.) **Study of Causes of Hydrogen Inclusion in Aluminum Using Deuterium as Tracer.** Yoshitsugu Mishima, Shizo Hirano, Naoaki Takahashi and Iichi Ogahara. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 16-20.

(E25s, 1-59; Al, *H)*

137-E. (Japanese.) **Effect of a Small Amount of Beryllium on Aluminum-Magnesium Alloys.** Toyoji Ushioda, Osamu Yoshimura and Shoichiro Mashiyama. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 29-33.

6 ref. (E25, 2-60; Al, *Be, Mg,* AD-p)

138-E. (Japanese.) **Improvement of Magnox Alloys Used for Canning Material in Carbon Dioxide Gas-Cooled Reactor.** Yoshitsugu Mishima and Naoaki Takahashi. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 68-72.

Mg-Al-Ca-Be alloys with varying amounts of Ca and Be were prepared and the effect of Ca and Be on the properties of the alloys confirmed. 5 ref.
(E25, T11, 2-60, 2-62; Al, Mg, *Ca, Be)*

139-E.* **Influence of Sulphur on the Castability, Tensile Properties, and Pressure Tightness of Sand-Cast Bronzes and Gunmetals.** H. Reiter.

British Foundryman, v. 51, Jan. 1958, p. 2-10.

Elementary sulphur was added to 85-5-5-5 and 80-10-2 gunmetals and 90-10 phosphor bronze from which D.T.D. bars, disks wtih inadequately fed bosses, and fluidity and castability test castings were cast in green-sand molds. A metal mold was used for comparing hot tearing characteristics. Results of this work showed that sulphur contents up to 0.3% had no deleterious effect on porosity, grain structure, tensile strength, and pressure tightness, or on the other properties examined. 15 ref.
(E25p, Q27a, 2-60, Q26q; Cu, *S*)

140-E.* Pressure or Diaphragm Moulding. Tom Barlow. *British Foundryman,* v. 51, Jan. 1958, p. 10-16.

Successful practice of pressure molding depends on the use of a sand of high strength and high flowability and the use of a diaphragm to apply high-pressure air through the whole of the sand area, resulting in a mold of high over-all density free from the packing variations associated with normal jolt-squeeze ramming. The time of the process is almost independent of the size of the mold so that the use of large boxes with a number of patterns in each box is encouraged. 10 ref.
(E19, E18r, 3-74)

141-E.* Surface Finish for Non-Ferrous Castings. *British Foundryman,* v. 51, Jan. 1958, p. 17-35.

Mold additions appear to have little influence on finish. Certain mold and core binders are shown to have a beneficial influence on finish, especially shell molding and CO_2 binders. To a certain extent the influence of binders on finish is a reflection of their influence on the flowability of the sand. Other variables that influence surface finish are alloy type, extent to which the sand has been used and pouring temperature, whereas pattern quality, venting, and green versus dry sand had no significant effect. 35 ref. (E18n, 9-71; EG-a 38)

142-E.* Use of Stearin Wax for Simulating Shrinkage Defects in Steel Castings. D. B. James and J. M. Middleton. *British Foundryman,* v. 51, Jan. 1958, p. 36-46.

Provided that the pouring temperature does not exceed 2° C. superheat, the freezing of pure stearin wax can give a useful guide to the distribution of shrinkage in plain carbon steels containing 0.2-0.3% C. Since the solidification shrinkage of stearin wax is greater than steel the analogy cannot be taken too far—castings fed to soundness in wax would be over-risered when made in steel. The successful use of the simulation technique is limited to quite small castings. 13 ref. (E25n, 9-68; CN)

143-E. Application of Quality Control to a Moulding-Sand System. L. A. Deaville. *Foundry Trade Journal,* v. 104, Jan. 9, 1958, p. 33-36.

Report of a two-year investigation to obtain a sand of known and consistent quality, permitting variation of sand properties at will. Result has been a general improvement in casting quality. (E18)

144-E. Pattern Details in Cast Iron. *Foundry Trade Journal,* v. 104, Jan. 9, 1958, p. 39-41.

Use of metal inserts for the larger types of wooden patterns and corebores; suitable materials and specific examples. (E17; CI)

145-E. Large Aluminium Die-Castings. A. F. Bauer. *Metal Industry,* v. 92, Jan. 10, 1958, p. 23-25.

Machine developments, die design and stress and pressure tests.
(E13, W19n, 17-51; Al)

146-E. (German.) **Microporosity in Sand and Chill Mold Castings of Magnesium Alloys.** Paul Spitaler. *Giesserei,* v. 44, Dec. 1957, p. 757-766.

14 ref. (E25q, 9-68; Mg, 5-60, 5-66)

147-E. (German.) **Testing the Hardness of Molding Sand.** Wolfram Ruff. *Giesserei,* v. 44, Dec. 1957, p. 766-769.

Avoiding difficulties in testing by modifying the spring in the test apparatus; conversion of hardness values into Brinell units. (E18r, Q29)

148-E. (German.) **Production of Nodular Cast Iron With Addition of Compounds.** Nurettin Cuhadar. *Istanbul Teknik Universitesi, Bulteni,* v. 10, no. 2, 1957, p. 28-38.

Possibility of replacing Mg, Ce and Ca with their compounds. 16 ref. (E25q; CI-r, *Mg, Ce, Ca*)

149-E. Gleason Works Achieves Newness in a Foundry. Robert H. Herrmann. *Foundry,* v. 86, Feb. 1958, p. 78-88.

Equipment, layout and procedures at the Gleason Works, Rochester, N. Y. (E general, 1-52, 18-67)

150-E.* Shrinkage in Tin Bronze. Clyde L. Frear. *Foundry,* v. 86, Feb. 1958, p. 92-97.

Effect, elimination and prevention of gas contaminants. (E25n, Cu-s, *Sn*)

151-E. Sodium-Silicate Bonded Steel Molds. P. J. Ahearn and G. I. Gartner. *Foundry,* v. 86, Feb. 1958, p. 98-101.

Use of sodium silicate, or waterglass, as a substitute for resin. (E19c; NM-f45)

152-E.* Manufacture and Use of Large Aluminum Die-Castings. Alfred F. Bauer. *Foundry,* v. 86, Feb. 1958, p. 102-106.

Present status of the die-casting process and outline of further application such as die cast V-8 engine blocks. (E13, 17-57; Al)

153-E. Surface Finish of Steel Castings. David V. Atterton. *Foundry,* v. 86, Feb. 1958, p. 107-111.

Sand fineness and grading, binder content, compaction, penetrating pressures, grain size, mold atmosphere, sand sintering and degree of ramming. (To be concluded.) (E18, E11; ST)

154-E. Forsterite Offers Advantages as Shell Mold Material. W. H. Owen. *Foundry,* v. 86, Feb. 1958, p. 134-137.

Suggested practice for preparing forsterite grains mix for shell molding of steel. (E19c; ST, NM-f45)

155-E. Casting Magnesium-Thorium Alloys. Thomas A. Dickinson. *Foundry,* v. 86, Feb. 1958, p. 156-158.

(E general; Mg, *Th*)

156-E.* Metallurgical Aspects of Hot-Tearing in Cast Steel. Kurt Beckius. *Foundry Trade Journal,* v. 104, Jan. 30, 1958, p. 115-123.

Results of casting experiments made in an apparatus designed on the resistance-spring principle. The resulting curves for time-contraction relationships were compared with the occurrence of tearing as manifested in macro-etched, tear-containing sections of cast test bars. The contraction-restraining load imposed on the specimens was removed at different time intervals after pouring, and data collected were further supplemented by temperature measurements during cooling and solidification. (E25n, Q26p; ST)

157-E. Why Bullard Prefers Gas Fuel in Most Modern Foundry. *Industrial Gas,* v. 36, Dec. 1957, p. 3-4.

Gas fuel is used for all heating operations except basic iron melting. (E general; CI, RM-m)

158-E. Handling Units Speed Foundry Cycle. *Iron Age,* v. 180, Dec. 5, 1957, p. 134-135.

Unit performs molding, closing and shaking-out operations without manual handling of flasks in foundry producing V-8 engine block castings. (E11, T21b, 18-74; CI)

159-E. How to Cut Costs on Patterns and Cores. R. B. Sinclair and W. N. Richards. *Iron Age,* v. 180, Dec. 12, 1957, p. 132-134.

Suggestions for simplifying and economizing in molding and coremaking and in pattern selection. (E17, E21g)

160-E. Production of F.H.P. Electric Motors. *Machinery,* v. 91, Nov. 22, 1957, p. 1184-1195.

Aluminum die casting, machining, welding and other operations in production of small electric motors. (E13, W11q, 17-57; Al)

161-E.* Heat Transfer From Die Casting Dies. H. K. Barton. *Machinery,* v. 91, Nov. 29, 1957, p. 1276-1283.

Nature and extent of heat input and heat losses in die casting Zn and Al. Requirements for water cooling, effect of variations in radiating surface and heat loss during interruptions in casting operations. Desirability of reducing thermal gradient; possibilities and requirements of high-temperature coolants. Thermal balance and question of die cavity surface temperature for production of sound castings. (E13, P11k; Zn, Al)

162-E. Cast Aluminum Products. *Modern Metals,* v. 13, Nov. 1957, p. 82-86, 90-92.

(E general; Al, 17-57)

163-E.* Heat Control in the Die Casting Process. A. F. Bauer. *Precision Metal Molding,* v. 16, Jan. 1958, p. 46-47.

Five places where heat must be controlled are the alloying room where metals are heated and superheated, the holding furnace, the dies, where heat exchange usually takes place, injection mechanism, and preheating inserts where they are used. (E13, A11e)

164-E. Prototypes That Show Casting Design Flaws. *Precision Metal Molding,* v. 16, Jan. 1958, p. 56-57.

Production of accurate die models; other services provided by a pattern and model shop. (E13, W19n, 17-51)

165-E. Moulding Characteristics of Jubbulpore Pale Grey Sand. U. C.

Sharma and B. R. Nijhawan. *Scientific and Industrial Research, Journal,* v. 16, Section A, Sept. 1957, p. 424-427.

(E18r)

166-E. Investment Caster Uses Vacuum. *Steel,* v. 141, Nov. 25, 1957, p. 96-98.

Details of melting cycle and mechanical properties of vacuum investment cast Ni-base alloys.
(E15, 1-73; Ni)

167-E. Carbon Arc Vs. Induction Melting. *Steel,* v. 142, Jan. 27, 1958, p. 74-76.

Comparison of techniques on the basis of part design, relative cost, control or reproducibility of results and versatility, from data compiled at a foundry using both methods for investment casting.
(E10r; E15, W18a, W18s, 17-53)

168-E. (French.) **Rational Modernization of Foundries.** Adolphe M. Plesinger. *Fonderie,* v. 142, Nov. 1957, p. 481-490.

Mechanization in Czechoslovakian foundries described by staff member of Institute for Foundry Research in Brno. 11 ref.
(E general, 18-74)

169-E.* (French.) **Study of the Possibilities of Making Pressure-Tight Castings in Light Alloys.** Louis Grand. *Fonderie,* v. 142, Nov. 1957, p. 491-498.

Oil tests under pressure on castings made of 20 Al alloys provide classification in order of increasing porosity, both before and after machining. Refining with Na or a flux that releases Na on contact with molten metal reduced porosity. A 5.6% Si, 3% Cu alloy was found best suited to production of parts studied. 4 ref. (E25r; Al, *Si, Cu,* RM-q)

170-E.* (French.) **Study of Cores Bonded With Sodium Silicate.** Maurice Decrop and Marcel Goguillon. *Fonderie,* no. 142, Nov. 1957, p. 499-515.

Cores bonded with sodium silicate withstand storage well in ordinary atmosphere but present stripping problems; sodium silicate binders and CO_2 process are best suited to production of medium and large-size cores. Graphs give compressive strength of cores of various compositions in all stages of preparation and use; cracking, blowholes, shrinkage, ease of stripping and breakdown analyzed in terms of binder composition, temperatures, atmospheres, influence of sodium silicate and CO_2. (E21, E18n)

171-E. (French.) **Contribution to the Study of Riser Systems in the Casting of Steel: Case of a Gear.** Marcel Jaumain. *Fonderie,* v. 143, Dec. 1957, p. 545-550.

Gear was cast with eight different pouring and riser combinations and castings examined for soundness. 5 ref. (E22q, T7a; ST)

172-E. (German.) **Special Brass Alloying Technique.** E. Brunhuber. *Giesserei-Praxis,* no. 24, Dec. 1957, p. 521-523.

Influence of single components (Al, Sn, Fe, Mn and Pb) on chemical and mechanical properties of special brass. (E25, 2-60; Cu-n, *Zn, Al, Fe, Mn, Pb, Sn*)

173-E. (German.) **Malleable Cast Iron With High Ductility.** A. Hohmann. *Giesserei-Praxis,* no. 24, Dec. 1957, p. 523-524.

Pressure casting in chill molds using graphite carbon. Best results are obtained with Cu content of 0.40-1.20%. (E22r; CI, *Cu,* AD-n32)

174-E. (German.) **Contribution to the Problem of Pinhole Formation in Steel Castings.** R. Radtke. *Giessereitechnik,* v. 8, Dec. 1957, p. 269-272.

Addition of FeO to melt produced pinholes; surface tension, which depends on oxygen content of melt, is important. Other causes.
(E25q, 9-68; ST)

175-E. (German.) **Riser Runner Method for Heavy Castings.** H. Giese. *Giessereitechnik,* v. 8, Dec. 1957, p. 279.

Casting technique demonstrated for 23-ton casting. (E22q; CI)

176-E. (Hungarian.) **Experience in Operation of Basic Cupola Furnaces.** Hungarian Iron Research Institute. *Kohaszati Lapok (Ontöde),* v. 12, Nov. 1957, p. 204-207.

(E10p, W18d; ST)

177-E. (Russian.) **Centrifugal Casting of Bi-Flanged Cast Iron Pipes.** M. M. Levin and V. M. Krapukhin. *Liteinoe Proizvodstvo,* June 1957, p. 1-4.

(E14, 4-10; CI)

178-E. (Russian.) **Production of Cylinder Blocks for Automobiles Using Aluminum Alloy Under Pressure.** T. I. Orlova. *Liteinoe Proizvodstvo,* June 1957, p. 7-8.

(E11, T21b, 3-74; Al)

179-E. (Russian.) **Preparation of High-Density Castings From Remelted Cop-**

per Alloys. A. D. Frolov. *Liteinoe Proizvodstvo,* June 1957, p. 16-18.

Right melting temperature and introduction of deoxidants, such as charcoal and reducing or oxide absorbing slags, is imperative to obtain improved bronze and brass castings. 13 ref.
(E25r; Cu, AD-r, RM-q)

180-E. (Russian.) **Surface Alloying of Die Castings.** A. M. Mikhailov and M. I. Serebryakov. *Liteinoe Proizvodstvo,* June 1957, p. 18-22.

Application of pastes containing powders of ferrochromium and ferromanganese to the mold surfaces and investigation of the penetration depth of Cr and Mn into the casting surface. 7 ref.
(E13, N1e, 5-61; AD-n)

181-E. (Russian.) **Hardening of Sands Containing Water Glass.** A. D. Belov. *Liteinoe Proizvodstvo,* July 1957, p. 1-4.

Composition of sands for steel, iron and bronze castings. Preparation and cure of molds and cores containing water glass.
(E18, E19, E21; ST, CI, Cu-s)

182-E. (Russian.) **Porosity Due to Shrinking in Castings.** I. B. Kumanin. *Liteinoe Proizvodstvo,* July 1957, p. 17-21.

Mathematical representation of rate of cooling of the molds. Direct relationship between casting porosity and the rate of cooling.
(E25n, 2-61, 9-68)

183-E. (Russian.) **Influence of Foreign Inclusions Upon Structure and Properties of Castings.** A. G. Spasskii. *Liteinoe Proizvodstvo,* July 1957, p. 21-25.

Influence of inert impurities such as metallic oxides and silicates upon structures and mechanical properties of Al alloys and bronzes. 11 ref.
(E25q, M27, Q general, 14-68; Al, Cu-s)

184-E.* (Russian.) **Problems on the Theory and Practice of Centrifugal Casting.** B. I. Loshkarev. *Liteinoe Proizvodstvo,* Aug. 1957, p. 1-6.

Results of experimental centrifugal casting of lead-rich bronze. Relationship between quality of the castings and rpm. of the mold, size of the mold, rate of cooling, rate of charging, temperature of the mold, temperature of the alloy and chemical composition. Mechanical properties presented in a tabulated form in relation to each factor. General conclusions on centrifugal casting techniques with emphasis on critical character of the process. 16 ref.
(E14; Cu-s, *Pb*)

185-E. (Russian.) **Improved Technology of Brass Propeller Casting.** K. P. Lebedev, T. N. Vikhoreva and A. I. Veselova. *Liteinoe Proizvodstvo,* Aug. 1957, p. 7-10.

(E general, T22h; Cu-n)

186-E. (Russian.) **Computation of Cooling Rate of Beam Type Castings in Sand Molds.** O. Yu. Kotsyubinskii. *Liteinoe Proizvodstvo,* Aug. 1957, p. 19-22.

(E11)

187-E. (Russian.) **Application of Exothermic Inserts for Head Heating.** E. M. Nosova and I. A. Svidrov. *Liteinoe Proizvodstvo,* Oct. 1957, p. 24-27.

Heating of steel casting heads by means of inserts made of a mixture of powdered Al and oxides brings efficiency of the casting process to 80-90%. (E22n; ST)

188-E. (Russian.) **Properties of Steel Cast Under Vacuum.** V. G. Gruzin and L. L. Gordon. *Liteinoe Proizvodstvo,* Oct. 1957, p. 30-32.

4 ref. (E10, Q general, 1-73; ST)

189-E. (Russian.) **Melting of Ball Bearing Steel in Large Electric Furnaces.** V. M. Sevastyanov. *Metallurg,* v. 2, Oct. 1957, p. 9-10.

Details of the process and comparison of sulphur contents in the metal before and after furnace discharge. (E10, T7d; ST)

190-E. Epoxy Resins for Patternmaking. K. H. Coombs, M. van der Wende and D. Jepson. *Engineer and Foundryman,* v. 22, Nov. 1957, p. 56-62.

New materials for patternmaking which overcome disadvantages in using wood on metal. (E17, NM-d30)

191-E. Phosphorus Dilution of Iron in Small Experimental Cupola. P. K. Gupte, S. S. Bhatnagar and B. R. Nijhawan. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 61-72.

3 ref. (E10a, 2-60; CI, *P*)

192-E. Improvement in Mechanical Properties of Bronze Castings by Nitrogen Degasification. P. K. Chakravarty and S. Visvanathan. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 119-130.

19 ref. (E25g, Q general, 1-73; Cu-s, *N*)

193-E.* Investment Casting of Precious Metal Jewelry. Ralph H. Atkinson. *Metal Progress,* v. 73, Feb. 1958, p. 97-101.

Although basic principles are the same as in casting other metals, melting and casting methods for Pt, Pd, Ag and Au vary considerably from those used in producing turbine buckets and machine parts. (E15, T9s, 17-57; Pt, Pd, Ag, Au)

194-E. Design and Application of Investment Castings. Alan G. Dimond. *Western Machinery and Steel World,* v. 49, Jan. 1958, p. 78-82.

Used for casting of buckets for Solar's Jupiter gas turbine and for other castings of complex nature. (E15, T24b, 17-57; SS)

195-E.* (French.) **Contribution to Principles of Design of Light Alloy Castings. Pt. 3. Principles of Design as Influenced by Direction of Pour and Molding.** Charles Roinet. *Revue de l'Aluminium,* v. 34, p. 1233-1239.

(E23, E19, 17-51; Al)

196-E. (German.) **Behavior of Green Molding Sands During Shock Heating.** H. G. Levelink. *Giesserei,* v. 45, Jan. 1958, p. 1-9.

Surface defects on casting. 9 ref. (E18, E19a; 2-62, 9-71)

197-E. (German.) **Measurement of Mold Hardness and Standard Test Body.** Franz Hofmann. *Giesserei,* v. 45, Jan. 1958, p. 9-13.

Testing methods, results, evaluation. 6 ref. (E19r; S22)

198-E. (German.) **Use of a Synthetic Resin Core Binding Agent in the Steel Foundry.** Emil Lange. *Giesserei,* v. 45, Jan. 1958, p. 22-23.

(E21, NM-d34; ST)

199-E. (Hungarian.) **Some Properties of Cast Iron Containing Titanium.** Arpåd Mocsy. *Kohaszati Lapok (Ontöde),* v. 12, June 1957, p. 121-129.

6 ref. (E25, P general, Q general; CI)

200-E. (Hungarian.) **Survey of Gating and Risering Systems.** Sandor Kalman. *Kohaszati Lapok (Ontöde),* v. 12, June 1957, p. 129-134.

27 ref. (E22p, E22q)

201-E. (Russian.) **Actual Problems in Metallurgy of Cast Iron.** A. F. Landa. *Liteinoe Proizvodstvo,* Oct. 1957, p. 13-15.

Special cooling technique for castings with widely different cross sections. (E25n; CI-r)

202-E. (Russian.) **Mechanization of Cleaning and Chipping of Castings.** P. I. Kozheurov. *Liteinoe Proizvodstvo,* Dec. 1957, p. 8-11.

(E24, 18-74)

203-E. Pearlitic Malleable Manufacture and Use. O. K. Hunsaker. *American Society of Mechanical Engineers,* Paper no. 57-A—241, Dec. 1957, 5 p.

Pearlitic malleable castings which have 45,000 psi. yield and 60,000 psi. ultimate strength to 80,000 psi. yield and 100,000 psi. ultimate strength with excellent heat treating properties. (E11, Q-general; CI-s)

204-E. Steps Taken by One Medium-Size Foundry to Meet Today's Competition. C. H. Ker. *American Society of Mechanical Engineers,* Paper no. 57-A—242, Dec. 1957, 8 p.

(E-general, W19, A9)

205-E. G. E. Foundry Modernization to Double Production in Ten Years. Robert H. Herrmann. *Foundry,* v. 86, Mar. 1958, p. 70-75.

Facilities for producing gray iron castings weighing up to 3000 lb. in the foundries operated by General Electric Co. at Elmira, N. Y. (E-general, 1-52; CI-n)

206-E.* **CO_2 Process Useful in Producing Experimental Castings.** R. L. Fehr and R. C. Harris. *Foundry,* v. 86, Mar. 1958, p. 80-82.

CO_2-hardened molds provided a convenient method of producing several experimental rigid fuse bodies at Frankford Arsenal. (E19; NM-f45)

207-E. Cast Epoxy Core Driers for Dielectric Ovens. John M. Leaman and Phillips L. Morrison. *Foundry,* v. 86, Mar. 1958, p. 85-87.

Inexpensive cast epoxy driers developed for use with contoured sand cores cured in dielectric ovens provide required thermal and dielectric properties and are made easily and economically. (E21)

208-E.* **Effect of Grain Size on Physical Properties of Synthetic Molding Sand.** Carl E. Schubert. *Foundry,* v. 86, Mar. 1958, p. 88-91.

Tests on silica sands with various average grain sizes but with clay and moisture held constant indicate that green permeability decreases with finer sands, green compressive strength remains constant and dry compressive strength increases with finer sands. (E18r)

209-E.* **Surface Finish of Steel Castings.** David V. Atterton. *Foundry,* v. 86, Mar. 1958, p. 92-95.

Depth of molten metal penetration through sand pores controls the amount of burnt-on sand that has

to be cleaned from a casting. The limit of penetration is defined by the location in the sand of the isothermal corresponding to the solidification temperature of the metal. Location of this isothermal is determined entirely by thermal factors such as thermal diffusivity of the sand and temperature of the metal-mold interface. Surface finish produced by new techniques such as chamotte molding. 8 ref.
(E25n; ST, 9-71)

210-E. (German.) **Castability of Some Alloys With High Nickel Content and Other Nickel Alloys.** D. R. Wood and J. F. Gregg. *Giesserei,* v. 45, Jan. 1958, p. 33-42.

6 ref. (E25p, 2-60; Ni)

211-E. (German.) **Production of Very Large Steel Castings From 13% Chromium Steel.** Georg Schmidt. *Giesserei,* v. 45, Jan. 1958, p. 43-47.
(E25q, E19, E21; SS, *Cr*)

212-E. (Hungarian.) **Oxidation at Surface of Molten Iron.** Gyula Nandori. *Kohaszati Lapok,* v. 12, Mar. 1957, p. 49-53.

Addition of Mn stops or diminishes oxidation. 8 ref.
(E25; Ci, *Mn,* 14-60)

213-E. (Hungarian.) **Preparation of Molding Sand.** Laszlo Demeter. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 73-77.
(E18)

214-E. (Hungarian.) **Laboratory Tests for Adhesive Strength of Core Binders.** Zoltan Juhasz. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 77-81.

4 ref. (E18n, E21)

215-E. (Hungarian.) **Experience With Wood Patterns Spread by Metal.** Lajos Hajdu. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 88-90.
(E17, W19j)

216-E. (Swedish.) **Design of Castings With Regard to Molding.** Alrik Ostberg. *Gjuteriet,* v. 47, Dec. 1957, p. 197-203.

(E19, 17-51)

217-E.* Canadian Hot-Blast Water Cooled Cupola. J. E. Rehder. *Foundry Trade Journal,* v. 104, Feb. 6, 1958, p. 143-146.

Advantages include; easily adjusted slag basicity; economy in refractory maintenance due to shell water-cooling; higher melting rate, lower coke requirements and decreased melting losses due to use of preheated ore supply; better control of iron composition, reduced need for repair. Initial cost is high but justifiable. (E10a, W18d; CI)

218-E.* Metallurgical Aspects of Hot-Tearing in Cast Steel. Pt. 2. Kurt Beckius. *Foundry Trade Journal,* v. 104, Feb. 6, 1958, p. 149-153.

Conditions under which tears form, characteristics of tears, effects of temperature and carbon content. 8 ref. (E25n, 2-60, 2-61; ST, 9-72)

219-E. Casting Iron Cannon. F. Evans. *Foundry Trade Journal,* v. 104, Feb. 6, 1958, p. 155-156.

Methods used from the 16th through 18th centuries for casting cannon. Initially a two-part mold consisting of the bore and the external shape were used. Later the cannon were cast solid and the bore drilled out. (E11, T2m; CI)

220-E.* Application of Risers With High Atmospheric Pressure. W. P. Desnizki. *Iron and Steel,* v. 31, Feb. 1958, p. 51-52.

Chromium-molybdenum steel was cast in an experimental plate, with compressed air being forced into a riser located near one end. Samples from various areas of the plate were analyzed. Steel content was reasonably uniform throughout; adequate density was maintained; air pressure did not guarantee freedom from cavities in thickened sections; oxidation of steel in riser did not affect over-all quantity.
(E22q; AY, *Cr, Mo*)

221-E.* Aluminum Alloy Castings. John L. Everhart. *Materials in Design Engineering,* v. 47, Feb. 1958, p. 125-144.

Sand, permanent mold and die castings, as well as investment and plaster mold castings. Specifications, engineering properties, design considerations, processing characteristics and applications. 11 ref.
(E-general; Al)

222-E. Investment Casting Offers Design Freedom, Economy for Host of Industries. Edouard C. Thys and Thierry N. Thys. *Western Metalworking,* v. 16, Jan. 1958, p. 49-51.
(E15)

223-E. (French.) **Pouring Design for the Production of Cast Iron Propellers.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 92, Nov-Dec. 1957, p. 3-4.

Shrinkage holes in area where blades join boss in heavy propeller castings (over 175 lb.) were eliminated by system of top pouring with ten pencil gates, sprues being removable from body of casting after

machining with graving tool or nylon grinding wheel. (E22p, T22h; CI)

224-E. (French.) **Fabrication of Parts in Malleable Cast Iron.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 92, Nov-Dec. 1957, p. 5.

Tests to determine optimum conditions for casting circular plates from 2 to 3 meters in diameter, with 25 by 45-mm. panels on one face. Particular requirement was Brinell hardness of between 120 and 150 in finished casting. Exclusive use of hematite pig of given composition produced desired results. (E25; CI-s)

225-E. (French.) **Casting of Gear Cases in Light Alloy.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 92, Nov-Dec. 1957, p. 9-11.

Details of pattern and gating design; use of chills. 3200 pieces were produced, with only one reject. (E17, E22p, E22r, EG-a39)

226-E. (German.) **Casting of Steel With Nitrogen as Protective Gas.** Paul Holtzhaussen and Hans Fiedler. *Neue Hütte,* v. 2, Nov. 1957, p. 685-691.

4 ref. (E23, E25; SS)

227-E. **Design and Production of Diecasting in Zinc Base and Aluminium Alloys.** P. A. R. Findlay. *Chartered Mechanical Engineer,* v. 5, Feb. 1958, p. 60-61.

Summary of paper to be published in *1958 Proceedings.* (E13, 17-51; Al, Zn)

228-E. (German.) **Molding Machines.** H. Kalpers. *Giesserei-Praxis,* v. 75, Dec. 10, 1957, p. 508-511.

Historical review. (To be continued.) (E19, 1-52)

229-E. (German.) **Cracks in Cast Steel.** R. Domanowski. *Giesserei-Praxis,* v. 75, Dec. 10, 1957, p. 505-508.

(To be continued.) (E11, 9-72; ST)

230-E. (German.) **Air Preheating in Foundry Operation.** A. Hohmann. *Giesserei-Praxis,* Jan. 10, 1958, p. 6-8.

Convection and radiation in the transmission of heat. Gain of heat by the application of preheating of air or fuel estimated at up to 30%. Discussion of the now customary recuperators and their manner of working. Recuperators for cupola furnaces, air heaters with tubes, radiation recuperators, rotating drum melting furnaces. (E10a, E10b)

231-E. (German.) **Casting of Lead Bronze.** E. Brunhuber. *Giesserei-Praxis,* Jan. 10, 1958, p. 12-14.

(E25n, M24c; Cu-s, *Pb*)

232-E. (German.) **Unusual Defects in Light Metal Castings.** Helmut Rogoss. *Giessereitechnik,* v. 3, Nov. 1957, p. 241-244.

(E11, 9; Al)

233-E. (German.) **Casting Production and Defect Report. Productivity Determination and Quantitative Control.** Presented by the Collective Organization of the "Hüttenverein" Foundries. *Giessereitechnik,* v. 3, Nov. 1957, p. 244-248.

(E-general)

234-E. (German.) **Development of Pressure Casting.** V. von Reimer. *Werkstatt und Betrieb,* v. 91, Jan. 1958, p. 21-24.

Machines, die-cast Al parts, pressure casting forms and alloys. (E13, 3-74; Al)

235-E.* (Japanese.) **Influence of Tellurium on Cast Iron Containing Titanium.** Tohei Ototani and Yoichi Tokunaga. *Casting Institute of Japan, Journal,* v. 29, Dec. 1957, p. 831-837.

Fe-C-Si alloys containing 0.2% Ti were remelted in graphite crucible in kryptol furnace. Up to critical amount of Te addition, graphite structure changes, due to difference in growth rate of austenite and graphite in solidification, 0.003-0.005% Te changing eutectic graphite to coarse flakes. Ferrite matrix is formed around fine graphite with excess Te and hardness is decreased. 9 ref. (E25q, 2-60; CI-q, *Te, Ti*)

236-E.* (Japanese.) **Structural Changes of Cast Iron Caused by Melting in Contact With Various Oxides.** Masao Honma. *Casting Institute of Japan, Journal,* v. 29, Dec. 1957, p. 837-845.

Influence of oxides in the refractories. In argon and carbon monoxide atmosphere flake graphite structure becomes finer as influenced by SiO_2, MgO, BaO and CaO, in that order. With Al_2O_3 there is no change. Sulphur content is reduced in similar order. Deoxidation and desulphurization in argon atmosphere. In CO atmosphere changes in graphite structure are due to changes of sulphur content of alloys. 11 ref. (E25q, 2-66; CI)

237-E. (Japanese.) **Study of Binding Clays.** Ryojiro Kono and Ichiyu Imao. *Casting Institute of Japan, Journal,* v. 29, Dec. 1957, p. 853-858.

Influence of clay impurities and minerals on green compressive strength of foundry sands. 3 ref. (E18n, 3-69)

238-E.* (Japanese.) **Studies of Foundry Silica Sands. Pt. 3.** Umeji Harada

and Keizo Nishiyama. *Casting Institute of Japan, Journal,* v. 29, Dec. 1957, p. 858-871.

Study of refractory properties of Tokai district silica sands by shock heating. Refractory quality in following order; synthetic silica sand, conical sand, natural sand, beach sand. 9 ref. (E18r)

239-E. Precision Pressure Casting. *Australasian Manufacturer,* v. 42, Dec. 14, 1957, p. 44-46.
(E15, 3-74)

240-E. Swelling of Wood Patterns. Lars Lange. *Foundry Trade Journal,* v. 104, Feb. 13, 1958, p. 175-177.

Analysis of the mechanism of swelling and shrinkage. Consequences of such action and preventive measures. (E17, W19j)

241-E. Canadian Hot-Blast Water-Cooled Cupola. Pt. 2. J. E. Rehder. *Foundry Trade Journal,* v. 104, Feb. 13, 1958, p. 184-185.

Experience indicates that banking this furnace overnight is more economical than dropping the bottom each night, contrary to original expectations. (E10a, W18d)

242-E. Process Charts Applied to Foundry Operations. F. Gaiger. *Foundry Trade Journal,* v. 104, Feb. 20, 1958, p. 203-209.
(E-general, A5)

243-E.* An Instrument for Measuring the Gas Content of Aluminium Alloys During Melting and Casting. C. E. Ransley, D. E. J. Talbot and H. C. Barlow. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 212-219.

The parameter to be measured is the internal pressure of hydrogen in the melt. The instrument depends on the circulation of a small stream of nitrogen through the metal. The volume of gas circulated must be kept very small (2-3 cc. S.T.P.) and a special pump, valves and analysis Katharometer were developed. Probable use for other metals. 6 ref. (E5m, 1-53; Al)

244-E.* Molding Characteristics of Allahabad Sand. U. C. Sharma, R. M. Krishnan and B. R. Nijhawan. *Journal of Scientific and Industrial Research,* v. 16A, Nov. 1957, p. 517-522.

Sand tests included chemical analysis, mechanical grading, high-temperature tests and examination of molding properties. Molding characteristics of unwashed sand bonded with 5% Bihar bentonite and mixtures of washed sand with bentonite dextrine, Kordek, linseed oil and silica flour were evaluated. (E18r, E19)

245-E. Molding Characteristics of Hardware Sand. B. V. Somayajulu and B. R. Nijhawan. *Journal of Scientific and Industrial Research,* v. 16A, Dec. 1957, p. 566-570.
(E18r, E19)

246-E. Stainless Castings With Unusual Hot Strength. Carl Tylka. *Materials in Design Engineering,* v. 47, Mar. 1958, p. 104-105.

Close control of solidification rate yields cast valves and fittings exceeding ASTM strength specifications. In large fittings, use of castings instead of forgings results in cost reduction of up to 40%.
(E25n, Q27a, 2-62; SS, 5-60)

247-E. Profitable Companions. Shell Cores and Green Sand Molds. Frank K. Shallenberger. *Modern Castings,* v. 33, Mar. 1958, p. 32-33.

The use of shell cores in conjunction with shell, permanent, or green sand molds offers substantial savings in material, labor and equipment. (E19a, E19c)

248-E. Good Practices With Better Refractories for Best Ladle Lining. J. H. Rickey, Jr. *Modern Castings,* v. 33, Mar. 1958, p. 35-38, 120-121.

Casting quality is greatly affected by ladle refractories.
(E23, W19b; RM-h)

249-E.* Risering of Gray Iron Castings. J. F. Wallace and E. B. Evans. *Modern Castings,* v. 33, Mar. 1958, p. 39-45.

A recommended procedure based on available data and original calculations. 35 ref. (E22q; CI-n)

250-E.* Some Structural Considerations in Nodular Iron. Verne Pulsifer. *Modern Castings,* v. 33, Mar. 1958, p. 46-48.

Solidification process; proposal that nodules form near the liquidus in a normal nucleation process rather than near or below the solidus. Studies of rapidly chilled shot support this thesis. Mechanism and structures resulting from formation of magnesium sulphide.
(E25q, N2; CI-r)

251-E.* Correlation of Green Strength, Dry Strength and Mold Hardness of Molding Sands. R. W. Heine, E. H. King and J. S. Schumacher. *Modern Castings,* v. 33, Mar. 1958, p. 49-58.

Experiments to correlate green and dry strength with mold hardness. Effects of moisture content and clay type and amount. (E18r, E19)

252-E.* Deoxidation Practice for Copper Shell-Molded Castings. R. C. Harris. *Modern Castings,* v. 33, Mar. 1958, p. 59-63.

Embrittlement of Cu shell-molded castings results from decomposition of the phenolic resin used in the shell mold, causing the "steam reaction". Of four deoxidizers examined, Ti and Li proved effective. Gas-fired and 20,000 cps. induction equipment were found suitable for melting pure Cu. 6 ref. (E16c, E10; Cu)

253-E.* Mold Surface Behavior. Dan Roberts and Earl E. Woodliff. *Modern Castings,* v. 33, Mar. 1958, p. 64-70.

A simple low-cost device to examine rate and amount of mold expansion during pouring. The effect of variables such as moisture content, clay content and grain distribution is predictable; thus expansion can be kept within allowable limits. (E19)

254-E.* Evaluation of Shell Molding Process Capability. W. C. Truckenmiller, C. R. Baker and G. H. Bascom. *Modern Castings,* v. 33, Mar. 1958, p. 71-76.

Procedures, specific results and conclusions from investigations for the evaluation of dimensional control capabilities of the shell process. Sampling procedures for the development of critical pattern dimensions. (E16c)

255-E.* Induction Melting in a Magnesium Sand Foundry. J. G. House and M. E. Brooks. *Modern Castings,* v. 33, Mar. 1958, p. 77-80.

Melting in a line-frequency induction furnace. Various types of foundry scrap, as well as primary Mg, were melted and the operating characteristics compared with those of a gas-fired filter-type furnace. (E10r, W18a; Mg, RM-p)

256-E.* Investigation of the Hardening of Sodium Silicate Bonded Sand. Carl E. Wulff. *Modern Castings,* v. 33, Mar. 1958, p. 81-85.

Effects of CO_2, evaporation hardening, nitrogen, setting time, 3% binder, thermal hardening and temperature on the tensile strength of silica sand. 5 ref. (E18r)

257-E.* Fundamental Studies on Effects of Solution Treatment, Iron Content, and Chilling of Sand Cast Aluminum-Copper Alloy. E. M. Passmore, M. C. Flemings and H. F. Taylor. *Modern Castings,* v. 33, Mar. 1958, p. 86-93.

Solution treatment temperatures and times greater than those normally employed result in substantial improvement of mechanical properties of Al-Cu sand castings. Reduction of iron content below 0.24% also improved properties significantly. (E22r, J27a, Q-general, 2-60; Al, *Cu*)

258-E. High-Integrity Aluminum Castings. A. R. Mead. *Product Engineering,* v. 29, Feb. 17, 1958, p. 69-71.

(E-general, Q-general; Al)

259-E.* Development of Casting Techniques for Uranium and Uranium Alloys. George E. Jaynes, James M. Taub and Denton T. Doll. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 1-15.

Shapes ranging from 1 to 1800 kg. cast in vacuum induction furnaces with either micarta tube or steel tank construction. Use of graphite coated with ceramic as material for crucibles and molds. Application of uncooled induction coils, induction stirring and use of castable refractories, glass and copper as mold materials.
(E10, 1-69, 1-73, 1-52, W19g; U)

260-E.* Centrifugal Casting of U-Zr Alloy Rods. Arthur B. Shuck. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 39-50.

Design, development and experimental evaluation of multiple mold centrifugal casting machine with precision copper molds used in connection with high-vacuum induction heated melting and pouring to produce fuel rods or slugs from uranium alloy with 2% Zr. 6 ref.
(E14, E10, 1-69, 1-73, T11g; U, *Zr*)

261-E.* Induction Melting of Uranium Base Alloys. Neill J. Carson, Jr. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 23-29.

Vacuum induction melting, alloying and casting of uranium, U-Cb, U-Zr, U-Mo, U-Cr, U-Si and U-Al. Use of coated graphite and other materials as crucibles and molds. (E10, 1-69, 1-73, W18h, W19g; U)

262-E.* Injection Casting of Uranium-Fissium Alloy Pins. F. L. Yaggee, J. E. Ayer and H. F. Jelinek. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 51-62.

Injection casting apparatus. Mechanical and physical properties of pins cast from artificially formulated uranium-base fissium alloys. 4 ref. (E16, 1-52, Q-general, P-general, T11q; U)

263-E. (German.) Production of Manganese Bronze. F. Paschke. *Gies-*

serei-Praxis, no. 3, Feb. 10, 1958, p. 45-47.

(E-general; Cu-s, *Mn*)

264-E. (German.) **Slag Strainer Sprue and Its Benefits.** W. Pischl. *Giesserei-Praxis,* no. 3, Feb. 10, 1958, p. 48-50.

Construction of slag strainer sprue must be adapted to each type of casting. Its use results in reduction of inclusions by 35-40%. (E22; 9-69)

265-E. (German.) **Influence of Calcium-Silicon on the Casting of Steel.** Friedrich Lindenbeck. *Giesserei-Praxis,* no. 4, Feb. 25, 1958, p. 74-75.

(E25; ST, *Ca, Si*)

266-E. (Italian.) **Technical and Economic Factors Involved in the Production of Good Castings.** Giuseppe Barchiesi. *Fonderia,* v. 6, Dec. 1957, p. 517-523.

(E-general)

267-E.* (Italian.) **Cupola Melting of Bronzes.** Giuseppe Barchiesi. *Fonderia,* v. 6, Dec. 1957, p. 528.

Parts in Cu-Sn-Zn alloy were cast by filling molds with approximate proportions of 60% and 40% respectively of molten metal taken from cupola and from holding furnace containing material transferred from cupola. Material in holding furnace was inoculated with phosphorus Cu and Zn was added before casting. Tensile tests revealed satisfactory mechanical properties. (E10a, Cu-s)

268-E.* (Italian.) **Use of Tellurium in the Cast Iron Foundry.** *Fonderia,* v. 6, Dec. 1957, p. 529-530.

Tellurium as an addition agent for promotion of area hardness in castings; in mold varnish for improvement of surface hardness. Improvement of microstructure of castings by balanced additions of Te and graphite. (E25q; Te, NM-k36, AD-q)

269-E. (Italian.) **Die-Casting Developments in Europe and America.** *Fonderia,* v. 6, Dec. 1957, p. 539-547.

Highlights of some of the papers presented at Congress of European Committee on Die Casting held in Paris, May, 1957. 11 ref. (E13)

270-E. (Italian.) **Feeding Distance of Risers in Castings of Uniform Wall Thickness. Notes on Practice in Modern Steel Foundries.** Michele Notte. *Fonderia Italiana,* v. 6, Dec. 1957, p. 463-468.

5 ref. (E22q)

271-E. (Italian.) **Processing of Foundry Sands and Clays in Modern Mechanized Equipment.** G. Somigli. *Fonderia Italiana,* v. 7, Jan. 1958, p. 2-8.

(E18n, E18p, W19h)

272-E. (Italian.) **Qualitative and Quantitative Determination of Clay in Foundry Sands by Means of Differential Thermal Analysis.** C. Pelhan. *Fonderia Italiana,* v. 7, Jan. 1958, p. 13-18.

(E18r)

273-E. (Portuguese.) **Production and Casting of Aluminum Bronzes.** Isaac Berezin. *ABM, Boletim da Associacao Brasileira de Metais,* v. 13, Oct. 1957, p. 365-385.

18 ref. (E-general; *Al,* Cu-s)

274-E.* **Further Studies on Some Factors Influencing Sinking Under Bosses on Thin Plates: The Role of Eutectic Nucleation.** A. G. Fuller. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Feb. 1958, p. 157-170.

Effect of manganese, sulphur, inoculation with ferrosilicon, superheating temperature and furnace holding time upon sinking. Relationship between the degree of nucleation of the melt (as determined by eutectic cell counts) and sinking. Factors, such as decreased superheating temperature or inoculation, which increase the nucleation of the melt, promote sinking. 9 ref. (E25n; CI)

275-E. Survey of Australian Foundry Industry for the Six Months Ending Oct. 31, 1957. *Castings,* v. 4, Jan. 1958, p. 5-11.

(E-general, A4)

276-E. Shell Molding . . . Ten Years of Progress. *Foundry,* v. 86, Apr. 1958, p. 80-85.

Share of market achieved by shell moldings. (E16c, A4p)

277-E. Suppliers Discuss Developments in Resins and Molding Equipment. *Foundry,* v. 86, Apr. 1958, p. 86-89.

Suggestions for more efficient use of foundry resins. (E16c; NM-f45)

278-E. How Five Foundries Use Shell Molding. Robert H. Herrmann and Jack C. Miske. *Foundry,* v, 86, Apr. 1958, p. 93-103.

Experience of Albion Malleable Iron Co., Bendix Aviation Corp., Engineering Castings Inc., M. A. Harrison Mfg. Co. and Midwest Foundry Co. in the shell mold casting of gray iron, steel, brass and malleble iron. (E16c)

279-E. Shell Pattern Equipment Must Meet High Standards. Ray Olson. *Foundry,* v. 86, Apr. 1958, p. 104-106.

Shell molding patterns are difficult to design, tougher to make, expensive to buy. Basic requirements of shell patterns together with the problems involved. (E16c, E17)

280-E. Controlling Variables in Processing Shell Molding Sands. Jack E. Bolt. *Foundry,* v. 86, Apr. 1958, p. 107-109.

Results of tests at the Foundry Resin Laboratory, General Electric Co., concerning effects of certain variables on properties of resin-coated sand for shell molding. (E18r, E19c)

281-E. Diecasting Foundry Makes Automotive Hardware Parts. Robert H. Herrmann. *Foundry,* v. 86, Apr. 1958, p. 110-113.

Modern Al and Zn die-casting facilities and automatic equipment for machining, buffing and plating are included in new Ford plant for producing automotive hardware. (E13, T21c; Al, Zn, 5-61)

282-E.* Problems in Making Stainless Steel Castings. Ernest A. Schoefer. *Foundry,* v. 86, Apr. 1958, p. 114-119.

Problems encountered by producers of high-alloy castings made of Fe-Cr and Fe-Cr-Ni alloys to resist heat or corrosion. Table indicates standard designations and chemical composition ranges for heat and corrosion resistant castings. (E11; SS)

283-E.* Factors Affecting Carbon Pick-Up in the Cupola. Michael Perch and Charles C. Russell. *Foundry Trade Journal,* v. 104, Mar. 13, 1958, p. 291-296.

Carbon solubility of various foundry cokes. Inverse correlation between solubility and ash content. Effects of Si and Mn content, coking time, and other variables. 9 ref. (E10a; CI, RM-j43)

284-E.* Influence of Blast Input, Coke Size and Melting Coke Ratios on Cupola Performance. Pt. 1. F. Danis and M. Decrop. *Foundry Trade Journal,* v. 104, Mar. 20, 1958, p. 319-326.

Detailed analysis of the effect of amount of coke, blast input and coke size on thermal efficiency of cupola, temperature and production of iron. (E10a; CI)

285-E. Influence of Blast Input, Coke Size and Melting Coke Ratios on Cupola Performance. Pt. 2. F. Danis and M. Decrop. *Foundry Trade Journal,* v. 104, Mar. 27, 1958, p. 351-358.

(Concluded.) (E10a)

286-E.* Gases in Cast Iron With Special Reference to Pickup of Hydrogen in Sand Molds. An Account of Recent Work and the Views of British Investigators. J. V. Dawson and L. W. L. Smith. *Modern Castings,* v. 33, Feb. 1958, p. 39-51.

Effects of gases, various alloying elements and components of sand molds on porosity of cast iron. (E25q; CI, 9-68)

287-E.* Observations on Pinhole Defects in White Iron Castings. R. W. Heine. *Modern Castings,* v. 33, Feb. 1958, p. 53-57.

Slag formation during cooling of the molten metal is a major cause of pinhole defects in white iron castings. Four identifiable types are observed: reaction pinholes, aspiration pinholes and bubbles, evolution pinholes, miscellaneous (isolated pinholes). Relation to the variable conditions of gating, pouring, sand and molding practices. (E11; CI-p, 9-69)

288-E.* Theoretical Concepts of the Packing of Small Particles. J. B. Caine and C. E. McQuiston. *Modern Castings,* v. 33, Feb. 1958, p. 58-61.

A mathematical analysis of the effects of particle size distribution on the packing configuration and density of foundry sands. (E18r)

289-E. Density of Sand Grain Fractions of the AFS Sieve Analysis. R. W. Heine and T. W. Seaton. *Modern Castings,* v. 33, Feb. 1958, p. 62-67.

Effects of fineness, impurities, geometric shape and jolting energy on the density of compacted silica sand grains. (E18r)

290-E. Controlled-Slag Hot-Blast Cupola. D. Fleming. *Modern Castings,* v. 33, Apr. 1958, p. 47-58.

14 ref. (E10a, W18d)

291-E. Purchase Specifications for Commonly Used Steel Foundry Mold and Core Sand Binders. E. G. Vogel. *Modern Castings,* v. 33, Apr. 1958, p. 59-62.

(E18n; NM-F45)

292-E.* Effect of Pressure During Solidification on Microporosity in Aluminum Alloys. S. Z. Uram, M. C. Flemings and H. F. Taylor. *Modern Castings,* v. 33, Apr. 1958, p. 63-68.

Aluminum alloys 356 and 195 were solidified under pressures varying

from atmospheric (15 psi.) to 16.7 times atmospheric (250 psi.) Pressures greater than atmospheric were found to result in a substantial reduction of microporosity in sand cast test specimens. The test castings were adequately risered and the alloys thoroughly degassed. (E25q, 3-74; 9-68, Al)

293-E.* **Foundry Characteristics of a Rammed Graphitic Mold Material for Casting Titanium.** H. W. Antes, J. T. Norton and R. E. Edelman. *Modern Castings,* v. 33, Apr. 1958, p. 69-76.

Surface finish, shrinkage, compressive strength, permeability and thermal conductivity of an expendable graphitic mold. Amount of surface contamination of Ti cast into this type of mold. All of the variables were studied as functions of the molding pressure and moisture content of the graphitic material. 5 ref. (E19, W19g; Ti, NM-k36)

294-E.* **Some Requirements for Successful Fluidity Testing.** S. A. Prussin and G. R. Fitterer. *Modern Castings,* v. 33, Apr. 1958, p. 77-84.

A new fluidity tester (fluidimeter) is designed to insure reproducible metal flow. Techniques to determine the actual rate of flow of the molten metal stream within the fluidity test mold. (E25p, 1-53)

295-E.* **Investment Castings Go Civilian.** *Steel,* Mar. 3, 1958, p. 95-98.

Manufacturers producing intricate and hard-to-fabricate parts can now look for help from investment castings, due to cutbacks in aircraft programs. Although investment castings are expensive, this process offers many offsetting advantages, such as design freedom and a reduction in secondary operations. (E15)

296-E.* **Automatic Metering of Magnesium Opens Cold Chamber Die Casting Applications and Markets.** F. C. Bennett. Paper from "Magnesium in Perspective", Magnesium Association, p. 201-203.

Automatic supply of molten Mg alloy to cold chamber die-casting machines permits production rates equal to hot chamber Zn or Mg machines. Simple, safe, flexible process produces good quality castings. (E13; Mg)

297-E. **Magnesium Precision Castings Open New Production Potential.** L. H. McCreery. Paper from "Magnesium in Perspective", Magnesium Association, p. 601-610.

Castings with dimensional tolerances of ± 1/64 in., draft angle of 0 to 1° and wall thickness of 0.100 in. are produced, requiring little machining. These are lighter and less expensive than conventional castings requiring considerable machining and finishing work. (E15; Mg)

298-E.* **Some Aspects of Control of Quality of Magnesium Alloy Castings.** P. A. Fisher. Paper from "Magnesium in Perspective", Magnesium Association, p. 801-805.

While test results on samples may be valid, these results may or may not reflect the actual characteristics of the piece in service. Quality control must be based on a knowledge of the conditions under which the tested item will be used. (E-general, S21, S12; Mg)

299 E.* **Cored Passages Open New Applications to Magnesium Castings.** John L. Everhart. Paper from "Magnesium in Perspective", Magnesium Association, p. 1201-1208.

Unlined passages as small as ⅛ in. diameter, or of noncircular cross-section, can be produced. High complex arrangements with curve radii of 2½ to 3 in. permit nonturbulent fluid flow. These internal passages simplify design and maintenance, reduce costs. (E21; Mg)

300-E. (German.) **Influence of Small Amounts of Foreign Elements in Casting Aluminum.** R. Irmann. *Aluminium,* v. 34, Mar. 1958, p. 128-130.

12 ref. (E25, Q-general, 2-60; Al, *Be, B, Cr, Na, P, Ti*)

301-E. (German.) **Defects and Faults in the Manufacture and Operation of Pressure-Casting Dies.** Gustav Lieby. *Giesserei,* v. 45, Jan. 30, 1958, p. 60-64.

(E13, W19n, 9-71)

302-E. (German.) **Development of Internal Stresses Leading to Cracks in Gray Iron Castings.** H. T. Angus and W. G. Tonks. *Giesserei,* v. 45, Feb. 13, 1958, p. 81-86.

12 ref. (E25q, 9-72; CI-n)

303-E. (German.) **Production of Spherodial Graphite Cast Iron by Blowing a Mixture of Calcium Carbide and Magnesium Into the Melt.** Hans Abrecht and Kurt Giesen. *Giesserei,* v. 45, Feb. 27, 1958, p. 113-117.

11 ref. (E25q, CI-r, *Mg,* AD-p36)

304-E. (German.) **Snake-Shaped Gate.** Wilhelm Petzka. *Giesserei,* v. 45, Mar. 13, 1958, p. 147-148.

Purpose and importance when casting light metal alloys; dimen-

sions; comparison with Rabinowitsch; applications. (E22p)

305-E. (German.) **Oxidation Loss of Liquid Lead.** E. Pelzel and H. Schneider. *Metall,* v. 12, Feb. 1958, p. 122-124.

Chemical mechanism; requirements for efficient melting of lead. 9 ref. (E10, R1h; Pb)

306-E. (German.) **Basic Hot-Blast Cupola in the Integrated Steel Works.** Heinz Voigt. *Stahl und Eisen,* v. 78, Mar. 6, 1958, p. 284-291.

5 ref. (E10a, 1-65, A4s; ST)

307-E. (Japanese.) **Production of Cast Iron With Steel Core Inserts. Pt. 6. Influence of Casting Temperature.** Taichito Usui and Yoshio Yamamoto. *Casting Institute of Japan, Journal,* v. 29, Nov. 1957, p. 755-757.

(E23, 2-61; CI, *ST*)

308-E.* (Japanese.) **Effect of Moisture on Molten Cast Iron.** Nobutaro Kayama, Toru Ishino and Kazuo Saito. *Casting Institute of Japan, Journal,* v. 29, Nov. 1957, p. 757-763.

Blown moist air at 1000° C. oxidized and increased chill tendency, total oxides, silica content and formed shrinkage cavities at 1400° C., no appreciable oxidation. High-temperature coke not changed. More moisture observed in cupola. (E10a; CI)

309-E.* (Japanese.) **Effect of Titanium on Cast Iron Properties in Cupola Melting.** Shigeyuki Hamada. *Casting Institute of Japan, Journal,* v. 29, Nov. 1957, p. 781-790.

With more than 0.17% Ti, eutectic structures of graphite appear. Dendritic austenite is observed in the microstructure with ferrite and pearlite in matrix although carbon and silicon contents are high. Higher mechanical properties are found than in ordinary cast iron. Supercooling occurs with high Ti content. 7 ref. (E25q, E10a, 2-60; CI, *Ti*)

310-E.* (Japanese.) **Properties of Shell Cores Made by Blowing.** Kaoru Kato. *Japan Foundrymen's Society, Journal,* v. 30, Jan. 1958, p. 19-24.

Most suitable air pressure is about 4 kg. per sq. cm. Shells of resin-coated sand containing only 2.5% resin have sufficient bending strength. Permeability of the shells is decreased. For 4% resin-coated sand, limited value of apparent density is 1.53 g. per cc. and value of porosity is 39.4%; for 2.5% resin content, values are 1.48 g. per cc. and 42.4% respectively. (E21, E19c; NM-f45)

311-E.* (Japanese.) **Efficiency of the Carbon Dioxide Process in Coremaking.** Yukio Kido and Jinichi Minamimura. *Japan Foundrymen's Society, Journal,* v. 30, Jan. 1958, p. 24-29.

Relationship between quantity and rate of carbon dioxide absorption and strength of hardened sand. Commercial binders and water glass were used. Amount of CO_2 absorbed is less than 0.7% of sand mixture. Better strength is obtained with 0.35% absorption. Amount of gas needed for hardening is 0.6-0.87% of the sand mixture. There is no advantage in mixing air with CO_2. (E18n, E21)

312-E. (Japanese.) **Sieves for Molding Sand Preparation. Pt. 1. Experiments on Various Factors.** Ryojiro Kono and Kenji Hashimoto. *Japan Foundrymen's Society, Journal,* v. 30, Jan. 1958, p. 29-37.

5 ref. (E18r, W19h)

313-E.* (Japanese.) **Treatment of Molten Iron by Electrolyzing Molten Slag. Pt. 3.** Masuteru Maruyama. *Japan Foundrymen's Society, Journal,* v. 30, Jan. 1958, p. 37-45.

The treated iron had the mixed structure of eutectic fine graphite and flaky graphite. Perfect nodular graphite structure was obtained by inoculation with 1-2% calcium-silicon. Inoculation with Fe-Si accelerated the growth of fine and nodular graphite to the flaky form. Relationship between cooling rate, structure and growth process. 17 ref. (E25q; CI-r)

314-E. (Japanese.) **Die Casting Aluminum-Magnesium Alloys.** Takuichi Morinaga. *Japan Foundrymen's Society, Journal,* v. 30, Jan. 1958, p. 45-51.

Means for preventing burning of the Mg, decreasing casting stresses and preventing hardness variations. (E13, 2-60, 2-61; Al, Mg)

315-E. (Swedish.) **Design of Castings With Regard to Molding. Pt. 2.** Alrik Ostberg. *Gjuteriet,* v. 48, Jan., 1958, p. 1-7.

(E19, 17-51)

316-E. (Swedish.) **"Inverse Grayness" in Malleable Iron.** Gustaf Ostberg and Carl-Ewest Gustafsson. *Gjuteriet,* v. 48, Jan. 1958, p. 8-11.

Possible causes of a gray surface rim in white iron castings. 9 ref. (E11, 2-61, 9-69; CI-p)

317-E. (Swedish.) **Design of Castings With Regard to Cores.** Alrik Ostberg. *Gjuteriet,* v. 48, Feb. 1958, p. 19-24.

(E21g, 17-51)

318-E. (Swedish.) **Wholly Rammed Cupola Linings.** Folke Sandford. *Gjuteriet,* v. 48, Feb. 1958, p. 25-27.

Melting test results show that ganister should have low moisture content and linings carefully dried to avoid cracks. (E10a; RM-h35)

319-E.* **Matchplates for Profit.** Ormie R. Scott. *Canadian Metalworking,* v. 21, Feb. 1958, p. 32-34.

While limited casting requirements often dictate the use of loose wood patterns, many foundries are accepting tco many borderline casting orders involving loose patterns. When planning production equipment, several pattern materials and procedures are available; each is governed by the requirements of the particular job. If a loose wooden pattern is in existence, mounting this on a wood or metal plate can increase production. (E17)

320-E. **Casting Aluminum Letters.** *Light Metal Age,* v. 16, Feb. 1958, p. 22-24.

(E-general; Al-b)

321-E. **Die Temperature Control.** *Metal Industry,* v. 92, Jan. 31, 1958, p. 89-91.

(E13, W19n, 2-61)

322-E. **Graphite Molds, Pressure Pouring System Casts Steel Freight Car Wheels.** R. E. Ford. *Western Metalworking,* v. 16, Feb. 1958, p. 46-49.

(E23, W19g; NM-k36, ST)

323-E.* (English.) **Study of High Strength Cast Iron. Pt. 2. Improvement of Cast Iron by O_2 Blowing.** Ichiron Iitaka and Kokichi Nakamura. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 1-4.

Oxygen blowing as a method of reducing carbon and silicon content. Relation between quantity of oxygen, percentage of carbon, percentage of silicon, tensile strength and blowing temperature. Effects of inoculation with calcium, silicon and aluminum. (E25r; CI-c)

324-E. (English.) **Some Studies on Cupolas.** Toru Ishino. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 5-8.

Study of blast pressures at wind box and at each section of a model cupola under nonburning conditions with varying tuyere ratio, effective height ratio, coke size and blast volume. (E10a, W18d)

325-E.* (English.) **Ability of Spherization of the Additional Metals for Spheroidal Graphite Cast Iron.** Takaji Kusakawa. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 9-12.

Holes in specimens of Swedish charcoal pig iron packed with calcium, magnesium or misch metal and heated to 1160° C. for 30 min. Metallographic evaluation of effect of addition on formation of spheroidal graphite and on other microstructural changes. (E25q; CI-r)

326-E. (English.) **Testing Method of Clay Content in Foundry Sand.** Jiro Kashima. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 27-31.

Use of adsorption and photometric analysis to evaluate characteristics of clay in foundry sand. Compares adsorption with the green strength of the sand. (E18r; RM-h35)

327-E.* (English.) **Study of Organic Binders for Molding Sand.** Jiro Kashima and Hiroshige Suzuki. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 33-37.

Investigates dryers for reducing hardening time of oil-bonded core sand and oxidizing type. Dryers such as cobalt-naphthanate shorten hardening time of linseed oil-bonded core sand. (E18n)

328-E. (English.) **Gas Pressure in Mold Cavity. Pt. 2.** Mototaka Mutaguchi. *Waseda University, Castings Research Laboratory Report,* no. 8, Nov. 1957, p. 39-42.

Investigates relation between permeability of sand mold and gas pressure of mold cavity by means of tube rammed with sand and gas generating material. Mathematical expression of relationship. (E18r, E19)

329-E. (English.) **Determination of the Melt Quality of 85-5-5-5 Red Brass.** Shigeo Oya and Umewo Honma. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 43-46.

Surface appearance and fracture of red brass castings containing gases and aluminum and silicon impurities observed in an attempt to develop method for evaluating melt quality. (E25, E23; Cu-n)

330-E. (French.) **Solidification Mechanism in Gray Iron.** Albert De Sy. *Fonderie Belge,* v. 2, Feb. 1958, p. 43-51.

Spontaneous nucleation and effect of impurities. Mechanism of eutectic crystallization, differences

between crystallization of normal and abnormal eutectic. Conclusions are applied to the study of the abnormal eutectic of gray iron casting with lamellar graphite. 10 ref. (E25n; CI-n)

331-E. (Russian.) **Steel Casting With Exothermic Heads on Molds.** I. M. Barabash and A. S. Shuper. *Liteinoe Proizvodstvo*, Dec. 1957, p. 4-5.

Application of exothermic mixtures in steel casting for heavy machine building industry, results in improved quality and considerable saving of metal.
(E22n, W25, 17-57; ST)

332-E. (Russian.) **Effect of Bismuth and Boron on Shortening Annealing Time of White Iron.** I. F. Kurtov, V. A. Zakharov, N. P. Chichagova and S. V. Ryabokon. *Liteinoe Proizvodstvo*, Dec. 1957, p. 20-21.

Addition of small quantities of Bi and B to white iron shortens annealing time by 25-35%, doubles Cr limits without lengthening annealing time, simplifies technology of obtaining malleable iron, makes possible use of malleable iron as structural material. 4 ref.
(E25, J23; CI-s, *B, Bi*)

333-E.* **Oxidation and Reduction Reactions in the Cupola.** G. Tarocchi. *Foundry Trade Journal*, v. 104, Feb. 27, 1958, p. 231-234.

Changes in composition of gases within the cupola, from oxidizing to reducing conditions. Effect of CO and CO_2 content on reaction temperature and of coke ratio on combustion efficiency. 18 ref.
(E10a; CI)

334-E.* **Nozzle and Sprue Design for Gooseneck Die Casting Machines.** H. K. and L. C. Barton. *Machinery (London)*, v. 92, Mar. 28, 1958, p. 727-735.

Causes of nozzle drip, recommendations for nozzle heating, methods of removing broken sprues, developments in sprue design, water cooling arrangements for sprue pins and importance of unrestricted metal flow. Reduction in weight of "dead metal" and the divided sprue are desirable. (E13, 1-52, 17-51)

335-E. **Fordath Shell Moulding Developments.** *Machinery (London)*, v. 92, Mar. 28, 1958, p. 736.

(E19c, E21)

336-E. **Design of Die-Castings. Pt. 6. Some Structural Features of Die-Cast Parts.** H. K. Barton. *Metal Industry*, v. 92, Feb. 28, 1958, p. 171-174.

(E13, 17-51)

337-E. **Control of Die-Casting Machines.** *Metal Industry*, v. 92, Mar. 28, 1958, p. 247-251.

(E13, 1-52)

338-E.* (German.) **Casting Properties of Aluminum-Silicon Alloys.** R. Kummerle. *Metall*, v. 11, Oct. 1957, p. 848-854.

Important part of the Si-Al phase diagram up to 25% Si is investigated as to casting properties. The flow properties largely depend upon the behavior at transition from the liquid to the solid state. A spiral-type mold was used for determining the solidification process. For certain sponge-type characteristics two explanations are offered: (1) Al develops dendritic primary crystals, which tend to interlock; (2) the crystallization heat of Si is higher than of Al, slowing down the crystallization process. 18 ref.
(E25n, E25p; Al-b, *Si*)

339-E. (German.) **Copper-Lead Alloys. Pt. 3. The Specific Volume of Solid and Liquid Alloys and Volume During Solidification.** E. Pelzel. *Metall*, v. 11, Nov. 1957, p. 954-958.

Various alloys (including Cu-Pb-Ni) are observed as to their behavior during the solidification process. The specific volume varies considerably from liquid to solid depending on the phase diagram; pipe, cavities, porosity and segregation can be explained from these variations and the corresponding expansion and contraction. Materials were investigated with 70 to 85% Pb, 15 to 80% Cu, and 30 to 50% CuNi. 8 ref.
(E25n, P10d; Cu-b, *Pb, Ni*)

340-E. (German.) **Precision Casting as a Method for Producing Small Parts.** Karl August Krekeler. *Technische Mitteilungen*, v. 50, Jan. 1957, p. 35-38.

6 ref. (E15)

341-E. (Russian.) **Mechanization of Shell Molding.** F. I. Smirnov and M. M. Budylin. *Liteinoe Proizvodstvo*, Jan. 1958, p. 3-5.

Casting in shell mold gives greater precision, cleaner surfaces and facilitates the extension of mechanization to all processes.
(E16c, 18-74)

342-E. (Russian.) **Use of Vibration During Crystallization to Eliminate Hot Cracks.** I. I. Novikov, G. A.

Korolkov and A. E. Semenov. *Liteinoe Proizvodstvo,* Jan. 1958, p. 7-8. 8 ref. (E25q, 9-22)

343-E. (Russian.) **Use of Artificially Refined Sand for Shell Molds.** V. I. Ivanov and E. P. Tolmachev. *Liteinoe Proizvodstvo,* Jan. 1958, p. 8-10.
(E18, E19c)

344-E. (Russian.) **Properties of Salt Patterns and Their Effects on Surface Quality of Permanent Molds.** F. D. Obolentsev. *Liteinoe Proizvodstvo,* Jan. 1958, p. 16-19.
(E12, E17)

345-E. (Russian.) **Effect of Iron on Properties of Bronze in Bimetallic Products.** E. M. Morozova and N. M. Leibova. *Stanki i Instrument,* Jan. 1958, p. 21-23.

Centrifugal casting, which is most suitable method for bimetallic revolving objects, also results in heightened iron content. However, through proper control of casting procedure, iron content can be kept to less than 1.5%, which would not alter the antifriction properties of bronze. (E14; Cu-s, *Fe*)

346-E. **Low-Temperature Molding.** *Aircraft Production,* v. 20, Feb. 1958, p. 84-86.

Development of steel powder and resin material with stable characteristics for several tooling applications. (E19, T6; ST, 2-63)

347-E. **Evaluation of Bentonites in the Steel Foundry.** Victor E. Zang. *Foundry,* v. 86, May 1958, p. 154-157.

Influence of various properties of western bentonite on molding sand mixes; and tests for measuring these characteristics. (E18n)

348-E. **Shooting Borings Into Cupola Reduces Melting Cost.** R. E. Dixon. *Foundry,* v. 86, May 1958, p. 218-221.

A compressed air device delivers scrap cast iron borings into the cupola melting zone, resulting in savings in scrap and refractory costs and reduced labor requirements. (E10a, RM-p)

349-E. **Oxygen Injection Process Aids Cupola Combustion Control.** John B. La Pota. *Foundry,* v. 86, May 1958, p. 269-276.

Injecting oxygen directly into the cupola through the tuyeres rather than introducing it into the air duct prevents dilution and leakage, permits rapid heating, more precise control of melting process, and gives uniformly good results. (E10a)

350-E. **Foundry Mechanization.** Trevor Kneale. *Iron and Steel,* v. 31, Apr. 1958, p. 125-128.

Large-scale mechanization project at Farington iron and steel foundry of Leyland Motors Ltd. Sand reclamation and mixing plant, filling and ramming of molding boxes, automatic airless shot-blasting plant, and complete reorganization and re-equipment of green sand molding plant. (E-general, W19, 18-74)

351-E.* **Cast Magnesium Airframe Parts.** L. H. McCreery. *Modern Metals,* v. 14, Apr. 1958, p. 66-70.

Precision Mg castings, with tolerances of 1/64 in. or less, draft angles of zero to 1°, and section thickness of 0.100 in. or less, now possible with advanced design methods.
(E-general, T24a, 17-57; Mg)

352-E. **Durability of Ingot Molds at the Kuznetsk Metallurgical Combine.** A. V. Plankina. *Stal',* no. 4, 1957, p. 362-365. (Iron and Steel Institute, Translation no. 534.)

Previously abstracted from original. See item 450-E, 1957. (E19)

353-E. **Feeding Steel Castings Produced by the Lost Wax Process.** M. L. Khenkin. *Liteinoe Proizvodstvo,* no. 5, 1955, p. 1-7. (Iron and Steel Institute, Translation no. 602.)

Previously abstracted from original. See item 240-E, 1955.
(E15, E23, CI)

354-E. **Testing and Evaluation of Binders for Foundry Sands.** Hans Reininger. *Giesserei-Praxis,* v. 75, Apr. 25, 1957, p. 176-181. (Iron and Steel Institute, Translation no. 704.)

Previously abstracted from original. See item 291-E, 1957. (E18n)

355-E. (French.) **Nickel-Copper-Chrominum Castings, Properties and Applications.** G. Henon. *Fonderie,* no. 144, Jan. 1958, p. 3-18.
(E-general, 5-60; Ni, Cr, Cu)

356-E. (French.) **Calculation of Attachment of Feederheads in Sand Casting. The Feederhead Neck.** R. Namur. *Fonderie Belge,* v. 28, Feb. 1958, p. 52-57.

Calculations for feederhead attachments; caloric saturation of sand; delivery, clearance, distance. Design and arrangement of feederheads. 5 ref. (E22n)

357-E. (French.) **Influence of Phosphorus on Quality of Light Alloy Cast-**

ings. Louis Grand. *Revue de l'Aluminium,* v. 35, Feb. 1958, p. 171-179.

4 ref. (E11, 9-74; Al-b, Mg-b, *P, Si*)

358-E. (French.) **The Croning Process for Casting Light Alloys.** Fernand Dabel. *Revue de l'Aluminium,* v. 35, Feb. 1958, p. 203-214.

High-precision high-quality method of producing thin, strong cores or molds using very fine sand and synthetic resin. Uses include shell casting, green sand casting, gravity die casting. (E19c, E11, E13; Al, Mg)

359-E. Investigation of the Refractory Lining, Blast-Feed and Size of Steelworks Hot Blast Cupolas. Wilhelm Patterson and Albert Oberhofer. *Giesserei,* v. 44, Apr. 25, 1957, p. 227-237. (Iron and Steel Institute, Translation no. 685.)

Previously abstracted from original. See item 217-E, 1957.
(E10a, W18d, 1-52; ST)

360-E. (German.) **Manufacturing Chill Molds for Brass Castings.** H. Kron. *Giesserei-Praxis,* Mar. 1958, p. 87-89.

(E11, 5-66; Cu-n)

361-E. (Japanese.) **Production of Cast Iron With Steel Inserts. Pt. 5.** Taichiro Usui and Yoshio Yamamoto. *Casting Institute of Japan, Journal,* v. 29, Sept. 1957, p. 637-643.

Coated inserts are not as effective as bare or polished steel. 4 ref. (E25, M28, 9-69, 9-71; CI)

362-E. (Russian.) **New Tasks in Furnace Melting.** L. M. Marienbakh. *Liteinoe Proizvodstvo,* Jan. 1958, p. 1-2.

26 ref. (E10, W18)

363-E.* An Investigation of the Flow of Foundry Alloys With Various Gating Systems Used in Sand Molding. M. Jeancolas. *British Foundryman,* v. 51, Mar. 1958, p. 119-127.

Indicates that metal at temperatures well above the liquidus acts much like water at normal temperatures, obeying the formulas of hydraulics. 34 ref. (E22p, S18q)

364-E.* Influence of pH Variation in Foundry Molding-Materials on the Surface Finish of Steel Castings. D. H. Houseman. *British Foundryman,* v. 51, Mar. 1958, p. 149-155.

Using a specially developed technique for measurement, the effect of varying pH on sand strength and quality of surface finish was studied. Variations over the range 5-11 had little effect on sand strength, none on casting finish. (E18r; ST)

365-E. Mould Hardness: What It Means. R. W. Heine, E. H. King and J. S. Schumacher. *Canadian Metalworking,* v. 21, Apr. 1958, p. 38, 40, 42.

(E18r, W19g)

366-E. Heavy Casting at the Newcastle Steel Works. Stanley G. Urane. *Castings,* v. 4, Feb. 1958, p. 7, 8, 11, 13, 15.

Mold making, casting and heat treatment of large steel rolls.
(E-general, W23k; ST)

367-E. Advances and Advantages in Shell Moulding. R. V. Keen. *Foundry Trade Journal,* v. 104, Apr. 10, 1958, p. 413-417.

(E19c),

368-E. Production Methods for Shell-Moulded Cast Crankshafts. H. N. Bogart and H. C. Grant. *Foundry Trade Journal* v. 104, Apr. 17, 1958, p. 451-459.

Ford Motor Co. Ltd. turns from forged to cast crankshafts.
(E16c, T21c)

369-E. Foundries in the East Midlands. *Foundry Trade Journal,* v. 104, Apr. 10, 1958, p. 419-427; v. 104, Apr. 17, 1958, p. 461-464.

Details on eight English foundries. (E-general, 18-67)

370-E. Design of Die-Castings. Pt. 6. Some Structural Features of Die-Cast Parts. H. K. Barton. *Metal Industry,* v. 92, Mar. 1958, p. 195-196.

(E-13, 5-61, 17-51)

371-E. Influence of the Delivery Pressure on the Quality of Pressure Die Castings. F. Richter. *Giesserei,* v. 43, no. 18, 1956, p. 540-547. (Henry Brutcher, Altadena, Calif., Translation no. 4050.)

Previously abstracted from original. See item 546-E, 1956. (E13)

372-E. (French.) **Capacity of Light Alloys to Produce Watertight Castings.** L. Grand and H. Garnier. *Fonderie Belge,* v. 28, Mar. 1958, p. 91-93.

(E-general, Q-general, Al, Mg)

373-E. (French.) **Nonmagnetic Castings.** Z. Tyszko. *Fonderie Belge,* v. 28, Mar. 1958, p. 94-95.

Properties and possibilities of nonmagnetic castings (austenitic castings: Mn-Cu-Al, Mn-Si-Al; and new ferritic aluminum castings). (To be concluded.)
(E-general, Q-general; Al, Mn, Ni)

374-E.* (French.) Manufacture and Application of Large Aluminum Pressure Die Castings. A. F. Bauer.

Revue de l'Aluminium, v. 35, Mar. 1958, p. 281-291.

Manufacture in U.S.A. Tonnage of Al pressure castings is higher than that of gravity and sand castings combined. Output of large parts requires very powerful casting machines, since high injection pressures improve quality of the metal. Manufacture of large molds, design of parts, testing methods. (To be continued.) (E13; Al)

375-E.* (German.) **Stability of Molding Sand at High Temperatures and Its Relationship to Casting Defects.** H. W. Dietert, V. M. Rowell and A. L. Graham. *Giesserei,* v. 45, Mar. 27, 1958, p. 157-166.

Origin of casting defects and experimental technique for detection of their causes. Types of scabbing; factors influencing scabbing—critical temperature, unaccommodated expansion and enclosed area and preventive measures; rat tails and sand humps and their prevention; testing of mechanical properties of sand in dry state and at heating is important to control casting defects. (E18r, E25; 9)

376-E. (German.) **Economic Efficiency of Sand Drying.** Eugen Schneider. *Giesserei,* v. 45, Mar. 27, 1958, p. 167-168.

Comparison of costs of plant-dried sand compared with ready-to-use dry sand. (E18r, 17-53)

377-E. (Hungarian.) **Properties of Phenolic Resins and Phenolic Sand System Used in Shell Molding Process.** Ambrus Gyözö. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 1-5.

(E19c; NM-d)

378-E. (Hungarian.) **Foundry Experience With the Waterglass-Carbon Dioxide Process.** Racz Otto. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 5-11.

7 ref. (E18n)

379-E. (Hungarian.) **Mechanization of Shell Molding Process.** Kalman Lajos. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 22-23.

17 ref. (E19c, 18-74)

380-E. (Hungarian.) **Production Defects in Alpaca Plates Caused by Gas.** Hegedus Zoltan. *Kohaszati Lapok,* v. 9, Jan. 1958, p. 34-38.

7 ref. (E25s; Cu, *Ni*)

381-E. (Russian.) **Foreign Practice in Casting Automotive Crankshafts.** P. I. Stepin. *Liteinoe Proizvodstvo,* Mar. 1958, p. 1-3.

Process development, especially in Ford plants and in W. Germany. Use of sand molds; shell casting. Composition, properties and technology of magnesium cast iron. (E11, E19c, T21c; CI)

382-E. (Russian.) **Technological Factors Limiting Durability of Molds.** V. M. Pishchev. *Liteinoe Proizvodstvo,* Mar. 1958, p. 7.

Centrifugal casting in nonlined chill molds. (E14, W19g)

383-E. (Russian.) **Continuous Casting of Centrifugal Pump Rotors in Shell Molds Using Sodium Silicate Binder.** M. A. Corchuganov and V. M. Robustov. *Liteinoe Proizvodstvo,* Mar. 1958, p. 7-10.

Economic advantages of the method compared with use of bakelite. Mold preparation technique and necessary apparatus; casting technique. Manual pouring is a disadvantage of the method. (E16c; 1-61; NM-f45)

384-E. (Russian.) **Mechanical Properties of Iron Die Castings.** G. K. Gedevanishvili and R. B. Zvenitskaya. *Liteinoe Proizvodstvo,* Mar. 1958, p. 10-11.

Laboratory die casting of two types of cast iron with pressure up to 12 kg. per sq. cm. Mechanical properties improved with increasing pressure. Similar effect of pressure remained also after heat treatment. (E13, 3-74; CI)

385-E. (Russian.) **Filling Molds by Automatic Conveyers.** I. B. Zaygerov. *Liteinoe Proizvodstvo,* Mar. 1958, p. 11-14.

(E23, 18-74)

386-E. (Russian.) **Inertia Knockout Grate for Heavy Castings.** G. Z. Lipovetsky and N. P. Burtsev. *Liteinoe Proizvodstvo,* Mar. 1958, p. 14-16.

Two types of knockout grate with 8 and 3 shock absorbers. Construction of suspending and supporting shock absorbers and vibrator. (E24g, W19m)

387-E.* (Russian.) **Some Factors Influencing Hot Cracking in Steel Castings.** A. M. Lyass and Jow-Yao-Ho. *Liteinoe Proizvodstvo,* Mar. 1958, p. 20-24.

Linear contraction of nondeoxidized steel; nitrogen treated steel; nitrogen saturated steel; oxygen saturated steel; hydrogen saturated steel. Effect of heat absorption capacity of molds. Deformation of steel at high temperatures. (E25; 9-72, ST)

388-E. (Russian.) **Closed Horizontal Cylindrical and Semi-Spheroidal Risers in Steel Casting.** M. D. Dvorkin, A. D. Nikiforov and V. I. Rudometkin. *Liteinoe Proizvodstvo,* Mar. 1958, p. 24-26.

Calculation and layout of risers, estimation of their diameter according to size of casting for round articles (gears, wheels, etc.) and for articles of different shape. Application of this type of riser decreased consumption of metal by 20-40%. (E22q; ST)

389-E. (Russian.) **Molding Mixes Without Coal Dust for Iron Casting.** R. M. Stromberg. *Liteinoe Proizvodstvo,* Mar. 1958, p. 27.

For castings up to 100 kg. green sand molds can be used without addition of coal dust. Molds are powdered with graphite to prevent scaling. (E19a)

390-E. (Russian.) **Use of Oxygen Enriched Blast in Cupola Furnace 300 MM. in Diameter.** L. M. Azarkh. *Liteinoe Proizvodstvo,* Mar. 1958, p. 27.

Increase of temperature; decrease of slag. (E10a, W18d)

391-E. (Swedish.) **Design of Castings With Regard to Pouring.** Alrik Ostberg. *Gjuteriet,* v. 48, Mar. 1958, p. 33-36.

(E22, E23, 17-51)

392-E.* **Note on the Use of Aluminum for the Deoxidation of Palladium and Its Alloys.** R. N. Rhoda and R. H. Atkinson. *AIME Transactions,* v. 212, Feb. 1958, p. 113-115.

Improved technique is especially suitable for use in making small castings with an induction melting and casting machine. Effect of various crucible linings on the efficiency of the residual deoxidizer and accompanying oxide film in protecting Pd against oxidation during remelting; the preferred crucible lining consists of zirconia cement. (E10b, 1-69; Pd, *Al,* AD-r)

393-E.* **Some Practical Experiences in Making Molds in a Mechanized Foundry.** H. Pinchin. *British Foundryman,* v. 51, Apr. 1958, p. 182-193.

Preparation of molds rammed entirely by slinging from the same sand system consisting of AFS 100 naturally bonded sand. Plant layout, molding boxes and green sand cores. (E19a, E21; 18-67, 18-74)

394-E.* **The Purification of Cast Iron by Oxidation.** R. H. T. Dixon. *British Foundryman,* v. 51, Apr. 1958, p. 197-203.

Impurities in cast iron removed by oxidation of the melt. Si, Mn, Ti, Pb, Cr, Ni, Cu and Al removed with low loss of carbon but Sn proved to be resistant to oxidation. P and S also eliminated by the use of oxygen and a basic slag. (E25q, 9-51; CI)

395-E. **The Maintenance of Plant and Equipment.** J. I. Blackbourn. *British Foundryman,* v. 51, Apr. 1958, p. 204-213.

(E-general; 18-67)

396-E. **What to Do About Porosity in Aluminum Castings.** John Obrebski. *Iron Age,* v. 181, May 15, 1958, p. 71-74.

(E25q; 9-68, Al)

397-E. **Pressure Die Casting of Necchi Sewing Machine Components.** *Machinery,* v. 92, Apr. 25, 1958, p. 973-982.

(E13, 1-52)

398-E. **Design of Die-Castings. Pt. 7. Means of Attachment for Die-Cast Components.** H. K. Barton. *Metal Industry,* v. 92, May 2, 1958, p. 347-349.

(Conclusion.)
(E13, K13; 17-51, 5-61)

399-E. **Designing for Aluminum Permanent Mold Castings. Pt. 2. Advantages and Limitations.** P. R. Kalischer. *Precision Metal Molding,* v. 16, Apr. 1958, p. 30-32.

(E12, 17-51; Al)

400-E. **Die Casting Lubricants, Their Purpose and Use.** R. D. Black. *Precision Metal Molding,* v. 16, Apr. 1958, p. 37-39.

(E13; NM-h)

401-E. **A Simplified, Low Cost, Vacuum Die Casting System.** Charles W. Ohse. *Precision Metal Molding,* v. 16, Apr. 1958, p. 42-45.

(E13, 1-73)

402-E. **Cast-In Tubing.** Herbert L. Kee. *Product Engineering, Design Edition,* v. 29, May 12, 1958, p. 76-79.

Tube inserts in die castings offer pressure tightness, compactness and light weight. (E13)

403-E. **The Effect of Nitrogen and Vacuum Degassing on the Properties of a Cast Aluminum-Silicon-Magnesium Alloy (Type 356).** R. K. Owens, H. W. Antes and R. E. Edelman. Frankford Arsenal. *U. S. Office of*

Technical Services, PB 131351, May 1957, 25 p. $.75.

(E25s; Al-b)

404-E. Sulphur in Magnesium-Treated Cast Iron. V. R. Balinskii. *Liteinoe Proizvodstvo,* no. 2, Feb. 1954, p. 18-19. (Henry Brutcher, Altadena, Calif., Translation no. 4097.)

Previously abstracted from original. See item 430-E, 1954, (E25, CI)

405-E. Methods of Producing Internal Motion in Centrifugal Castings During Their Solidification. S. E. Rozenfel'd. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 24-26. (Henry Brutcher, Altadena, Calif., Translation no. 4170.)

(E25q; SS)

406-E. (English.) **Contributions to the Study of the Graphitization Process in Nodular Cast Iron.** K. I. Vashtshenko and L. Sofroni. *Revue de Métallurgie (Bucarest),* v. 2, 1957, p. 51-82.

The graphitization process in nodular as contrasted with gray cast iron; volume changes that take place in solidifying and cooling 28 ref. (E25n; CI-s)

407-E. (French and German.) **Casting of Nonferrous Plumbing Parts.** R. Schlatter. *Pro-Metal,* no. 61, Feb. 1958, p. 933-946.

(E-general, T6a; Cu-n, Cu-s)

408-E. (German.) **The Use of Metal Chills in Steel Casting.** Hermann Wesner and Wolfgang Probst. *Giessereitechnik,* v. 4, Feb. 1958, p. 30-32.

(E22r; ST)

409-E. (German.) **Contribution to the Problem of Surface Defects in Steel Casting.** Joseph Czikel. *Giessereitechnik,* v. 4, Feb. 1958, p. 32-34.

(E25, 9-71; ST)

410-E.* (German.) **Addition of Oxide-Preventing Elements on Surface of Metal Melts.** Friedrich Erdmann-Jesnitzer, Hansfriedrich Hadamovsky and Rosemarie Görner. *Zeitschrift für Metallkunde,* v. 49, Mar. 1958, p. 133-140.

Distribution of addition agents in basic metals in solid and in liquid state. Mechanism of protective effect of trace elements on surface oxidation. (E25, R1h)

411-E. (Russian.) **Improved Method of Production of Bimetallic Bushings.** L. N. Gorodetskii. *Vestnik Mashinostroeniya,* Mar. 1958, p. 39-40.

Use of centrifugal casting for fusion of bronze and steel.
(E14, T7d; Cu-s, ST)

412-E. (Russian.) **Improvement of Steel Casting Technique.** M. N. Kravetz. *Stal',* Jan. 1958, p. 40-42.

(E11; ST)

413-E. (Spanish.) **Applications of Alloys in Cast Iron Production.** Thorval Andersen. Paper from *Second National Congress of the Steel Industry,* Mar. 1957, p. 143-152.

(E25; CI-q, *Cr, Mn, Si,* AD-n)

414-E. (Spanish.) **Casting Design.** Manuel Lizcano A. Paper from *Second National Congress of the Steel Industry,* Mar. 1957, p. 261-265.

(E-general; 17-51)

415-E. General Principles of Cupola Operation. H. J. Leyshon. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Apr. 1958, p. 224-248.

Importance of combustion conditions; mechanism of the combustion processes; relationship between the melting rate, coke charge and blast rate; influence of these factors on metal temperature; factors influencing silicon loss or gain, carbon pick-up, sulphur control. 21 ref.
(E10a; CI)

416-E. New Methods for Bath Production at Greenford. *Foundry Trade Journal,* v. 104, May 8, 1958, p. 539-546.

Cast iron bathtub founding and finishing plant.
(E11, 1-52, L27, 18-67; CI)

417-E. Designing Vacuum Plaster Mold Castings. W. G. Wilkins. *Machine Design,* v. 29, Nov. 1958, p. 106-108.

(E16a, 1-73)

418-E.* The Necchi Die Casting Foundry. *Machinery, (London),* v. 92, Feb. 28, 1958, p. 499-507.

Pressure die casting of arm and bed castings and other sewing machine parts. Layout and organization of new foundry; the die castings are 70% Al and the remainder Zn alloys. Output is approximately 50 tons per month.
(E13, T10c; Al, Zn)

419-E. The Production of Shell Molded Crankshafts. J. R. Vinette. *Machinery, (London),* v. 92, May 16, 1958, p. 1159-1161.

(E16c, T21b; ST)

420-E. Process Controls for Making Turbine Castings. Robert Ahles. *Mechanical Engineering,* v. 80, Apr. 1958, p. 61-63.

Advances in production of high-quality steel castings for turbine application. (E11, W11, 9-18; ST)

421-E.* The Parlanti Mold Process for the Casting of Metal by Controlled Rate of Heat Transfer. Conrad A. Parlanti and Rodger D. Veneklasen. *Modern Castings,* v. 33, May 1958, p. 79-85.

Method of controlling the even cooling of a cast mass to obtain optimum physical properties in castings at least comparable to the test bar figures expected from any particular alloy. Applicable to all light alloys, cast irons and steels. (E19, E25n; CI, ST, EG-a39)

422-E. Experiences in Non-Ferrous Die Casting Die and Permanent Mold Life. G. Otto. *Modern Castings,* v. 33, May 1958, p. 86-88.

Control of die maintenance, lubricants, die materials and mold coatings. (E13, E12, W19n)

423-E. Progress in Vacuum Die Casting. David Morgenstern. *Modern Castings,* v. 33, May 1958, p. 101-104.

(E13, 1-73)

424-E.* Magnesium Content and Graphite Forms in Cast Iron. James F. Ellis and C. K. Donoho. *Modern Castings,* v. 33, May 1958, p. 105-111.

Effect of increasing Mg content in three different base irons on tensile properties and graphite structures. Transition structures in changing from flake to spherulitic graphite. Effect of excessive Mg content on graphite form. An extension of the standard system of graphite classification is suggested. (E25q; CI-r, *Mg*)

425-E. A Method of Casting Radiator-Type Fuel Elements for a Nuclear Reactor. A. W. Hare and R. F. Dickerson. *Modern Castings,* v. 33, May 1958, p. 112-114.

(E12, T11g; U)

426-E. Some Remarks on the Relationship of Interface Temperature and Solidification. V. Paschkis and J. W. Hlinka. *Modern Castings,* v. 33, May 1958, p. 115-123.

(E25n)

427-E. New Aluminum-Magnesium-Zinc Casting Alloy. H. C. Rutemiller. *Modern Castings,* v. 33, May 1958, p. 124-126.

(5 ref.) (E-general; Al, *Mg, Zn*)

428-E.* Ductile High Strength Titanium Castings by Induction Melting. J. Zotos, P. J. Ahearn and H. M. Green. *Modern Castings,* v. 33, May 1958, p. 127-132.

Tests indicate that scrap Ti can be reprocessed by induction melting and still exhibit desirable engineering characteristics that make it a useful foundry alloy. 22 ref. (E10, 1-69; Ti, RM-p)

429-E.* Occurrence and Elimination of Leakage in a Gun Metal Casting. Marvin Glassenberg, Alfred H. Hesse and William H. Baer. *Modern Castings,* v. 33, May 1958, p. 133-139.

To overcome porosity of gun metal castings, chills of the same material and a specially designed ring-type gating system are used. (E22p, E22r; Cu-b, 9-68)

430-E. Foundry Practice for Sand Casting Commercially Pure Aluminum. Robert V. Scalco and Moss V. Davis. *Modern Castings,* v. 33, May 1958, p. 140-142.

(E11; Al-a)

431-E.* (French.) Aspects of Automation in the Foundry. Jacques Le Covec. *Fonderie,* v. 146, Mar. 1958, p. 105-112.

Presuppositions of automation: mass production, standardizing of single operations and specialization of workers. Examples of automation in cupola furnace process, sand preparation and molding, trimming and heat treatment. Advantages of automatic processes. (E11, 18-74)

432-E. (French.) Aging of Core Sand With Dextrin. Method of Testing Dextrin for Foundry Purpose. Claude Konlein. *Fonderie,* v. 146, Mar. 1958, p. 113-118.

Behavior in drying and in forming of molding sand compound kept for some time in hermetically closed containers. Examination of molding dextrin by testing its solubility and rotative ability. Best dextrin must have a solubility between 45 and 70% and a rotative ability of 140-150°. (E18r)

433-E.* (French.) Economical Method of Nodular Cast Iron Production by Treatment of Liquid Melt With Iron-Silicon-Magnesium Alloy. Nicolas Volianik. *Fonderie,* v. 146, Mar. 1958, p. 119-135.

History of use of Mg in cast iron. Outline of modern processes. Experimental technique using Fe-Si-Mg alloy and specially designed apparatus. Improvement in quality of cast iron. (E25q; CI-r; *Mg*)

434-E. (French.) Casting With Carbon Dioxide. *Journal d'Informations Techniques des Industries de la Fonderie,* No. 94, Mar. 1958, p. 5-9.

Evaluation of advantages and disadvantages of the CO_2 method of hardening sand cores with sodium silicate binder. (E18n)

435-E. (German.) **Production of Large Castings for Heavy Machines in the Soviet Union.** P. F. Wassilewski. *Giesserei,* v. 45, Apr. 10, 1958, p. 193-197.

(E-general; ST)

436-E.* (German.) **Unusual Casting Defects.** Walter Goschel. *Giessereitechnik,* v. 4, Feb. 1958, p. 37-40.

Gas bubbles causing blowholes may originate through the use of 55-mm. diameter cores instead of 60-mm. Large parts with thick walls may become defective if the molding sand becomes heated, expands and presses on fixed cores. (E11, E25, 9-68)

437-E. (German.) **Savings in Materials Using Spheroidal Pressure Riser.** Karl Heinz Meinecke. *Giessereitechnik,* v. 4, Mar. 1958, p. 49-53.

Construction of closed ball-shaped pressure riser possessing chalk-core for increase of pressure and a tangential entrance. Decrease of scrap as compared with usual riser. (E22q)

438-E.* (German.) **Segregation in Gray Cast Iron Chill Castings.** Wolfgang Gaude. *Giessereitechnik,* v. 4, Mar. 1958, p. 58-59.

Appearance and prevention of droplets (segregation) on castings. Mechanism of this type of segregation. (E22r, 9-69; CI-n)

439-E.* (German.) **Use of Separating Cores in Steel Casting.** Friedrich Dubielzig. *Giessereitechnik,* v. 4, Mar. 1958, p. 62-65.

Use of cores for easy separation of risers. Composition of core mixtures for green sand and dry casting. Forming of cores and molding technique. Applications. (E19, E21; ST)

440-E. (Italian.) **Possibilities of Reducing Fabrication Costs in Small Foundries.** Giuseppe Barchiesi. *Fonderia,* v. 7, Jan. 1958, p. 3-9.

(E-general, A4s)

441-E. (Italian.) **Computation of the Surface Area of a Sand.** Rinaldo Cattaneo. *Fonderia,* v. 7, Feb. 1958, p. 91-95.

(E18r)

442-E. Scrap Castings Caused by Hard Spots. H. Reininger. *Foundry Trade Journal,* v. 104, May 15, 1958, p. 573-578.

Undesirable hard spots and edges in castings may be reduced by careful control of C and Si content, using cementite-free pig, removing Cr and V impurities and redesigning mold to eliminate or reinforce fins and air vents. (E11, 9-71; CI, *Cr, Si, V*)

443-E.* **Casting Ferrous Metals in Anodized Molds.** Lester D. LaMotte. *Precision Metal Molding,* v. 16, Mar. 1958, p. 46-48.

Problems of permanent mold casting minimized by development of the Parlanti mold. It is anodized cast Al, designed to give the most desirable rate of heat transfer so that the mold surfaces are not destroyed by overheating and the casting has the best internal structure. (E12; 17-57, Al)

444-E.* **Designing for Aluminum Permanent Mold Casting. Pt. 1. Alloy Selection.** P. R. Kalischer. *Precision Metal Molding,* v. 16, Mar. 1958, p. 51-53.

Nominal compositions and equivalent specifications; mechanical properties; comparative ratings in castings, application, and service; typical physical properties of Al permanent mold alloys. (E12, Q-general, P-general, 17-51; Al)

445-E. Basic Hot Blast Cupola in the Integrated Steelworks. Heinz Voigt. *Stahl und Eisen,* v. 78, Mar. 6, 1958, p. 284-291. (Iron and Steel Institute Translation no. 902.)

Previously abstracted from original. See item 306-E, 1958. (E10a, 1-65, A4s; ST)

446-E. (German.) **Casting Properties of the Stanniferous Cast Copper Alloys.** Wilhelm Patterson. *Giesserei,* v. 45, Apr. 24, 1958, p. 220-228.

17 ref. (E25; Cu-b, *Sn*)

447-E. (German.) **High-Pressure Casting Dies and Equipment for the Production of Centrally Gated Die Castings on Horizontal Chamber Die Casting Machines.** Walter Bovensmann. *Giesserei,* v. 45, Apr. 1958, p. 244-247.

(E13, E22p, 1-52)

448-E.* (German.) **Grain Refinement of Aluminum and Its Alloys.** Elfriede Dittrich. *Neue Hutte,* v. 3, Feb. 1958, p. 93-101.

Movement, casting and superheating temperatures, as well as cooling velocity and small-scale inoculations with Ti, B, Zr, V, Cb, Mo and W, investigated. Both Ti and B seem

to be particularly advantageous for grain refining. 19 ref. (E25q; Al)

449-E. (Italian.) **Chill Casting of Light Alloys.** Biagio Caliri. *Revista di Meccanica,* v. 9, Mar. 1, 1958, p. 9-16.

(E22r; Al, Mg, Li)

450-E.* (Portuguese.) **Cast Iron Pistons.** Alberto A. Arantes, Cyro Guimaraes and L. A. Lacerda Santos. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 5-18.

Composition of Brazilian raw materials, pouring techniques, mold design and addition elements analyzed for influence on casting defects, mechanical properties, microstructure of pistons. In spite of high phosphorous content of Brazilian pig, structures compare favorably with those of foreign-made pistons. Low sulphur content of some pig was found to impede formation of lamellar graphite. 8 ref. (E11, T21b, 17-57; CI)

451-E.* (Portuguese.) **Molding Sands Agglomerated With Wet Clays as Compared to Dry Clays.** Victor Lo Re. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 53-62.

Wet clay obtained from source near place where study was conducted (cost therefore being a fraction of that of dry clay) provided greater compression strength and AFS hardness than same clay in powder form or a commercial powdered clay. Tests were made on damp as well as dried samples of mixtures. (E18r)

452-E. (Russian.) **Drying of Cores in a High-Frequency Electrical Field.** Yu. P. Basin. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 7-10.

Among the advantages of high-frequency drying of casting cores are a decrease in the heat expenditure and very favorable conditions for automation of the process. (E21h, 1-69)

453-E.* (Russian.) **Linear Changes of Ceramic Molds in Heating and Cooling.** O. V. Stupishina. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 20-23.

Addition of fireclay powder lowers the linear expansion by 2.5 times and of fused quartz by 6 times. A ceramic based on silicate suspension with waterglass as bond and with fireclay powder prevents sharp linear changes during heat treatment. Expansion and contraction curves obtained with optical dilatometer and precision furnace with maximum heating temperature of 1000° C. (E19)

454-E. (Russian.) **Melting 18 KHNVA Steel in an Arc Furnace.** V. K. Petrov, A. P. Kopeikin and E. D. Mokhir. *Stal',* v. 18, Apr. 1958, p. 326-330.

(E10r, W18s; ST)

455-E. (Swedish.) **Casting Defects and Their Causes.** J. Drachmann. *Gjuteriet,* v. 48, Apr. 1958, p. 49-55.

4 ref. (E25q, 9-68)

456-E. (Swedish.) **Design of Castings With Regard to the Fettling Operations.** Alrik Ostberg. *Gjuteriet,* v. 48, Apr. 1958, p. 56-59.

(E25q, E22p, E22q, 17-51)

457-E. Cavity Proportions Upon Metal Flow. *Australasian Manufacturer,* v. 42, Oct. 5, 1957, p. 44-50, 67, 68.

Control of metal flow in die casting by correct choice of the sprue, runner and gate and varying orientation of cavity in respect to the gate. (E13, E22)

458-E. Vacuum Die Casting Processes. *Australasian Manufacturer,* v. 42, Oct. 19, 1957, p. 70-79.

(E13, 1-73)

459-E. Some Aspects of Mold-Making. A. E. Peace. *British Foundryman,* v. 51, May 1958, p. 239-241.

Presidential address given before the Institute of British Foundrymen. 9 ref. (E19)

460-E.* Mold and Core Production by the CO_2 Process at the Blakeborough Foundries. T. C. Wilson and J. B. Hollis. *British Foundryman,* v. 51, May 1958, p. 241-250.

Sand mixes, effects of various additives, blacking methods, gassing equipment and methods; application to various types of molds and cores, examples; analyses of labor and material costs. (E19, E21, E18)

461-E.* Inverse Chill in Grey Cast Iron. G. T. Brown and R. T. Allsop. *British Foundryman,* v. 51, May 1958, p. 251-256.

Inverse chill showed the features of acicular carbide and undercooled-type graphite which have been previously reported. Inverse chill is produced by the interaction of a number of factors. In the present case the high sulphur:manganese ratio is considered to be primarily responsible for the stabilization of white iron. 15 ref. (E25n; CI-n)

462-E.* The Production of the British Motor Corporation Series "C" Cylinder-Head Casting. L. W. Bolton. *British Foundryman,* v. 51, May 1958, p. 257-265.

Molding and core-making; examination and gaging of cores. The metal is cupola melted; tests used to control its properties; special gaging and checking operations. (E11; CI)

463-E. Improvement and Probable Trends in Non-Ferrous Melting and Casting. James R. Hunt. *Castings,* v. 4, Mar. 1958, p. 5-19.

(To be continued.) 19 ref. (E10, W18, C5; EG-a38)

464-E. The Foundry Industry in Finland. *Castings,* v. 4, Mar. 1958, p. 19-23.

(E-general)

465-E. Recent Developments in the Manufacture of Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Chartered Mechanical Engineer,* v. 4, Nov. 1957, p. 444-446.

Developments during last decade in foundry practice; shell molding, CO_2 process, Shaw process, nodular cast iron, new casting alloys. (E-general)

466-E. Light Alloys for Casting Tricky Shapes. *Design Engineering,* v. 4, May 1958, p. 58-59.

Trade-named Tens-50 new Al alloy can be cast with minimum rejection rates by sand or permanent mold methods. (E11, E12; Al-b)

467-E.* Risering of Steel Castings With Exothermic Sleeves. H. F. Bishop, H. F. Taylor and R. G. Powell. *Foundry,* v. 86, June 1958, p. 54-59.

Use of exothermic sleeves in risers permits reduction in riser diameter and volume as well as a longer solidification time for molten steel. (E22q; ST)

468-E.* Die Castings in Ammunition Design. L. G. Klinker, Morris A. Gardepe and Robert H. Ridgway. *Foundry,* v. 86, June 1958, p. 60-61.

Small ammunition parts fabricated by Zn die casting, Al die casting or permanent mold casting of iron. (E13, E12, T2j; Al, CI, Zn, Fe)

469-E. Foundry Modernization. Pt. 3. Robert H. Herrmann. *Foundry,* v. 86, June 1958, p. 62-64.

General Electric Co. facility for permanent mold production of gray cast iron; cupola, pattern shop, quality control. (E12, W18c, W19j)

470-E. Institute of Metals Jubilee Meeting. Works Visits: J. Stone and Co. (Charlton) Ltd. R. J. M. Payne. *Metal Industry,* v. 92, May 16, 1958, p. 403-405.

(E-general, 1-52; Al, Mg, 5-60, 18-67)

471-E. Idea Tour of European Foundries. C. A. Sanders. *Modern Castings,* v. 33, June 1958, p. 38-41.

Summary of developments in general foundry practice, sand handling, automation, CO_2 molding and pattern design. (E-general)

472-E.* Rigging Design of High Strength Magnesium Alloy Castings. Merton C. Flemings, Richard W. Strachan, Ernest J. Poirier and Howard F. Taylor. *Modern Castings,* v. 33, June 1958, p. 45-50.

Production of two high-quality Mg alloy sand castings. One casting was composed of relatively heavy sections (½ to 2 in. thick) and the other of thin sections (1/10 to ½ in. thick). Chilling substantially improved the properties of the heavy section casting in both AZ91C and AZ92A alloys. Chilling had little effect on the mechanical properties of the thin section casting. (E22r; Mg-b)

473-E. Sintered Alumina Molds for Investment Casting of Steels. F. C. Quigley and B. Bovarnick. *Modern Castings,* v. 33, June 1958, p. 51-55.

Investment casting molds made by coating wax pattern with slurry and aluminum oxide produce good castings in less time with reduced costs. (E15, W19g)

474-E. Carbon Dioxide Cores in a Malleable Foundry. George Nestor. *Modern Castings,* v. 33, June 1958, p. 56-60.

(E21g)

475-E. Problems Encountered in Casting Reactive Metals. W. A. Aschoff and D. H. Blair. *Modern Castings,* v. 33, June 1958, p. 61-64.

High cost, difficulty of temperature control, lack of suitable mold materials are factors to be overcome before castings of this type are feasible on a large scale. (E-general; Zr, Ti)

476-E.*. The Problem of Hot Molding Sands. R. W. Heine, E. H. King and J. S. Schumacher. *Modern Castings,* v. 33, June 1958, p. 65-71.

Sands must be cooled to 160-170° F. before effective mulling can begin. Other problems such as moisture condensation, sticking

sand, become less severe as it is cooled to 120° F. or lower. (E18)

477-E. Steel Scrap Specifications for Duplexing Cupola White Iron. R. H. Greenlee. *Modern Castings,* v. 33, June 1958, p. 72-74.

Careful control of scrap purchased, to eliminate undesirable alloys and other unsatisfactory conditions, results in marked savings in material and cost.
(E10a, RM-p, ST, CI-p)

478-E.* The Chemical Treatment of Copper Alloys. R. W. Ruddle. *Modern Castings,* v. 33, June 1958, p. 75-81.

Review of chemical methods of treating alloys to reduce melting losses, prevent dross formation, remove gases, or produce desired grain structure. 17 ref.
(E25; Cu, *Sn, Pb, Zn*)

479-E. Sieve Ratios and Processing for Strong Molding Sands. J. Parisi, O. C. Nutter and C. Michalowski. *Modern Castings,* v. 33, June 1958, p. 82-87.

Analyses of grain sizes and packing characteristics, tempering and mulling variables. Recommendations for optimum results. (E18)

480-E.* The Effect of Some Gases on the Work of Adhesion Between a Novolak and Quartz. Dennis W. G. White and Howard F. Taylor. *Modern Castings,* v. 33, June 1958, p. 92-98.

A quantitative study of the individual effect of nitrogen, oxygen, water vapor and ammonia on the bond strength between phenolformaldehyde resin and a refractory metal oxide. These experiments lead to conclusions regarding the bond between the resin and metal oxide of a shell mold. 11 ref. (E19c, E18n)

481-E.* Industrial Applications of Olivine Aggregate. Gilbert S. Schaller and W. A. Snyder. *Modern Castings,* v. 33, June 1958, p. 99-104.

Compared to silica, olivine offers slightly greater cooling effect, increased heat capacity, uniform thermal expansion, resistance to fracture by thermal shock. It is replacing conventional materials in several specific applications. (E18r)

482-E.* On the Release of Hydrogen From Molten Aluminum. Asutosh Pal and H. M. Davis. *Modern Castings,* v. 33, June 1958, p. 105-108.

A significant portion of the hydrogen in molten Al can be removed by treatment with briquettes containing magnesium oxychloride weighted with corundum. The decomposition products of the briquettes make no objectionable addition to the Al. 6 ref. (E25s; Al, *H*)

483-E. Permanent Mold Casting With New Magnesium Alloy. Frank Gaines. *Western Metalworking,* v. 16, May 1958, p. 48-49.
(E12; Mg-b, *Th, Zr*)

484-E.* (French.) **Employment of Gases in the Foundry and in Metallurgy.** Albert Portevin. *Fonderie,* v. 147, Apr. 1958, p. 153-156.

Employment of gases in metallurgy from the physico-chemical and the chronological viewpoints. In the former there is the effect of the gases on the quality of the casting; in the latter the role of the gases is considered in melting, pouring and solidification.
(E-general; EG-m44)

485-E. (French.) **Graphitization of Castings by Gas Inoculation.** Georges Blanc and Nicolas Volianik. *Fonderie,* v. 147, Apr. 1957, p. 157-173.

Nitrogen gas is bubbled through a casting bath by a graphite tube. Machinability of thin gray iron castings is improved by avoiding the formation of hard zones due to the presence of cementite. Other advantages are elimination of inclusions and stability of the graphite. 38 ref. (E25n, G17k; CI-n)

486-E. (French.) **Some Metallurgical Phenomena in the Cupola Furnace.** Francois Danis. *Fonderie,* v. 147, Apr. 1958, p. 179-182.

Summary discussion based on previously conducted studies of the influence of the quantity of air in casting analysis and carburization phenomena. (E10a; CI)

487-E.* (French.) **Impregnating Porous Pieces for Water Tightness.** *Fonderie,* v. 147, Apr. 1958, p. 183-191.

Effectiveness of various impregnating products available on the French market for rendering castings water-tight under pressure. Casting specimens were light alloy and bronze disks. (E25, EG-a39, Cu-s)

488-E. (German.) **Determination of Bath Volume in Melting Titanium in Arc Furnace.** Alexej Nowikow and Robert Brenner. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 199-201.

Method to calculate depth of the bath on the basis of distribution of an extraneous metal. Experimental

technique using manganese. Calculation of bath depth by the method of the smallest squares. (E10r; Ti)

489-E. (Italian.) **Die Casting.** Roberto Allara. *Rivista di Meccanica,* v. 9, Mar. 1, 1958, p. 17-31.
(E13)

490-E. (Italian.) **Technique and Applications of Investment Casting.** Oscar Gherbaz. *Rivista di Meccanica,* v. 9, Mar. 1, 1958, p. 47-52.
4 ref. (E15)

491-E.* (Japanese.) **Mechanism of Hot Tearing in Steel Casting. Pt. 1. Results of Observing Hot Tear Fractures and Metallographic Structures Around Hot Tears.** Susumu Oki. *Japan Foundrymen's Society, Journal,* v. 30, Feb. 1958, p. 83-88.

Hot tear fractures and metallographic structures around hot tears in sand cast carbon steel castings containing 0.20 to 0.25% carbon and having wall thickness of 10 to 50 mm. Almost all the hot tears showed indications that they grew between dendrites of primary crystals. In a few cases, hot tearing occurs on boundaries of primary austenite grains after complete solidification. This kind of hot tear can easily be distinguished from interdendritic ones. 6 ref. (E25n, 9-72; ST)

492-E. (Japanese.) **Cupola Studies. Pt. 3. Notes on Blast Flow.** Toru Ishino. *Japan Foundrymen's Society, Journal,* v. 30, Feb. 1958, p. 95-103.
(E10a, W18d)

493-E.* (Japanese.) **Packing Properties of Molding Sand.** Jiro Kashima and Kazuya Miyazaki. *Japan Foundrymen's Society, Journal,* v. 30, Feb. 1958, p. 104-107.

Relationship between packing properties and grain size distribution of a molding sand, where the degree of ramming is constant. Maximum packing property was obtained when the mixing ratio in weight of coarse and fine grain size of uniform sands was 4:6. Packing properties of sands are also influenced by the choice of binders. 5 ref.
(E18r)

494-E.* (Japanese.) **Study on Sand Adhesion to Castings. Pt. 1. Velocity of Liquid Metal Penetration in Sand Mold.** Toshiro Owadano and Hideo Mikashima. *Japan Foundrymen's Society, Journal,* v. 30, Feb. 1958, p. 108-113.

Velocity of metal penetration in sand mold investigated by attaching the sand specimen to the surface of molten Pb and Sn, which are kept at constant temperatures, and applying negative pressure to the specimen for penetration. The sand specimen is prepared by baking sieved silica sand mixed with linseed oil as a binder. Depth of metal penetration is related to the time of penetration. 10 ref. (E11; 1-54)

495-E.* (Japanese.) **Some Studies on Cupolas. Pt. 4. Relation Between Air Flow and Chemical Reaction in the Cupola on Melting Conditions.** Toru Ishino. *Japan Foundrymen's Society, Journal,* v. 30, Mar. 1958, p. 144-152.

Melting rate, properties of melts, gas distribution and changes of blast pressure in the furnace. Effects of small and large tuyeres.
(E10a)

496-E.* (Japanese.) **Some Considerations on Cupola Operation by Mixing Tekken Briquette Coke.** Masao Sawada. *Japan Foundrymen's Society, Journal,* v. 30, Mar. 1958, p. 159-166.

No difference in the quality of molten iron can be observed when the low-sulphur coke and the Tekken briquette coke are mixed in a 50:50 ratio and used as split coke in the hot blast cupola. 8 ref.
(E10a; RM-j43; CI)

497-E.* (Japanese.) **Segregation in Castings. Pt. 7.** Kazuo Yasuda. *Japan Foundrymen's Society, Journal,* v. 30, Mar. 1958, p. 166-170.

Segregation in samples of 99.07% pure aluminum and Al-Cu alloy of 5.8% Cu were used for the preparation of samples solidified at different rates. 7 ref.
(E25n, 9-69; Al, *Cu*)

498-E. (Russian.) **Defects Caused by Phosphorous Impurities in German Silver Alloys.** Z. Hegedus and M. Stefan. *Acta Technica,* v. 20, no. 3-4, 1958, p. 297-304.

Effect of phosphorus contamination on structure and technological properties of Cu-Ni alloys.
(E25q, Q-general, 9-69; Cu, *Ni, P*)

499-E. (Russian.) **Linear, Surface and Blowhole Shrinkage of Magnesium Cast Iron.** K. I. Vashchenko, R. P. Todorov and V. V. Zhizhchenko. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 14-20.

Study of the shrinkage of magnesium cast iron as a function of the chemical composition, in particular Mg and Si content, and the crystallization time factor. 16 ref.
(E25n, P10c; CI-r)

500-E. (Russian.) **Deoxidation of Lead Bronze Bearings With Powdered Material (70% Pb, 30% Cu).** G. S. Pronyakov. *Vestnik Mashinostroeniya,* no. 2, Feb. 1958, p. 61-63.
(E25s; Cu-s, *Pb,* AD-r)

501-E. A French Glossary for Foundrymen. Pt. 1. *British Cast Iron Research Association, Bulletin,* v. 14, May 1958, p. 353-361.
Compilation by the abstracting staff of the British Cast Iron Research Association. (To be continued.) (E-general, 11-67)

502-E. Foundry Modernization. Pt. 3. Robert H. Herrmann. *Foundry,* v. 86, June 1958, p. 63-64.
General Electric's permanent mold gray iron casting facilities, pattern shop and quality control operations. (E12, W19, 18-67; CI-n)

503-E. Automated Molding and Pouring. *Foundry,* v. 86, June 1958, p. 71-76.
(E19, E23, 18-74)

504-E.* Effects of Composition on Soundness and Properties in Some Foundry Bronzes. W. T. Pell-Walpole. *Foundry Trade Journal,* v. 104, June 5, 1958, p. 681-686.
Critical pouring temperature for the rapid deterioration in density and mechanical properties which sand-cast bronzes and gun-metal suffer is directly related to the solidus of the alloy and is therefore very sensitive to its phosphorus content. A mold wash of 10% Al_2O_3, 10% plumbago in tar-oil, raises the critical temperature for reaction and thus extends the safe-range. (E25n, E22s; Cu-s)

505-E.* High-Speed Diecasting Line Features Automatic Pouring. Herbert Chase. *Iron Age,* v. 181, June 12, 1958, p. 96-98.
Die casting of aluminum turbo-type torque converter transmission parts with automatic pouring. Holding furnaces automatically send a precise amount of molten Al to the diecasting unit. Dies weigh 17½ tons, are parted through the long axis of the casting. Large hydraulically actuated cores are pulled horizontally from each end of the casting. Radiant gas heaters keep dies hot during production lull.
(E13, T21c; Al)

506-E. Vacuum Die Castings of Zinc Have Low Porosity, Good Surface, Thin Walls. John L. Everhart. *Materials in Design Engineering,* v. 47, June 1958, p. 110-112.
(E13, 1-73; Zn)

507-E. Automated Foundry System Is Flexible. *Steel,* v. 142, June 16, 1958, p. 98-99.
(E23, E19b, E25, 18-74; CI-s)

508-E.* (French.) Modern Casting Methods. Pierre Prette. *Mecanique,* v. 42, Feb. 1958, p. 111-117.
Lost wax, Croning and Shaw processes. Development of spheroidal (or ductile or nodular) cast irons and methods of manufacture. All French nodular irons are made with addition of Ni-Mg alloy, resulting in high Mg content.
(E25, E15, E16c; CI)

509-E.* (German.) Considerations on Theory of Shell Molding. A. Braybrook and B. H. C. Waters. *Giesserei,* v. 45, May 8, 1958, p. 263-277.
Stability of sands used; hardness of the shell; influence of clay addition; gas permeability and gas content of the shell; closing the shell; gates and risers. Effect of shell on casting structure. Comparison between shell molding and other methods. (E16c, 10-51)

510-E. (German.) **Sand Cooling in Mechanized Foundries.** H. Grolman. *Giesserei-Praxis,* v. 76, Mar. 25, 1958, p. 99-100.
(E18)

511-E. (German.) **Use of HC Coke in Cupola Furnace.** A. Hohmann. *Giesserei-Praxis,* v. 76, Mar. 25, 1958, p. 104-105.
(E10a; RM-j43)

512-E. (German.) **Wheel Made in Model Shaped Sand Mold.** A. Ahrendt. *Giesserei-Praxis,* v. 76, Mar. 25, 1958, p. 106-109.
Use of model from wood and wax substitutes for usual pattern lowers manufacturing costs for molding single piece of wheel. (E17)

513-E. (Russian.) **How to Increase the Productivity of Foundry Shops in Gorki Region.** N. I. Dutikov. *Liteinoe Proizvodstvo,* Apr. 1958, p. 1-2.
(E-general)

514-E. (Russian.) **Low-Silicon Casting and Pig Iron for High-Quality Castings.** N. A. Barinov. *Liteinoe Proizvodstvo,* Apr. 1958, p. 7-10.
(E11; *Si,* CI, CI-a)

515-E. (Russian.) **Compacting of Core Mix by the Sandblowing Method.** V. G. Rakogon. *Liteinoe Proizvodstvo,* Apr. 1958, p. 15-19.
(E21)

516-E. (Russian.) **Some Factors Affecting Hot Cracking in Steel Casting.**

A. M. Lyass and Chzhoi Yo-Kho. *Liteinoe Proizvodstvo,* Apr. 1958, p. 19-23.
10 ref. (E-general, 9-72; ST)

517-E. (Russian.) **Pressure Control in Runner Systems.** B. V. Rabinovich. *Liteinoe Proizvodstvo,* Apr. 1958, p. 26-28.
7 ref. (E22p, 3-74)

518-E.* (Spanish.) **Nodular Castings.** Francisco Rodriguez Yufera. *Instituto del Hierro y del Acero,* v. 11, Jan-Mar. 1958, p. 1-23.
Theories of nucleation and development of spheroidal graphite nodule in inoculated castings; possibility that this mechanism can be explained by Frank's theory of dislocations. It is assumed that nucleation arises directly from germ or submicroscopic impurity in suspension in liquid metal by supersaturated vapor of inoculating agent, begins to grow according to mechanism described by Frank and Read, with nodule developing inside austenite. 24 ref.
(E25, N2; CI-r)

519-E. Permanent Molds: The Die-coat Must Be Right. V. H. Furlong. *Canadian Metalworking,* v. 21, May 1958, p. 24-26.
Purposes, selection and application of die coat in permanent molding. (E12)

520-E. Improvement and Probable Trends in Non-Ferrous Melting and Casting. Pt. 2. James R. Hunt. *Castings,* v. 4, Apr. 1958, p. 5-21.
Review of Al and Mg foundry practice. (E-general; Al, Mg)

521-E. New Thames Foundry, Ford Motor Co., Ltd. *Foundry Trade Journal,* v. 104, May 29, 1958, p. 627-663.
(E-general, W10a, T21b)

522-E.* Super-Strong Light-Alloy Castings. Merton C. Flemings and Howard F. Taylor. *Machine Design,* v. 30, June 12, 1958, p. 23-24.
Production of superior castings by strict control over alloy analysis, melting variables, gating, molding, chilling, risering and heat treatment. 9 ref.
(E25, E22, J-general; EG-a39)

523-E. Ferranti Die Castings for Electricity Meters. *Machinery,* v. 92, May 30, 1958, p. 1287-1291.
A light alloy die-casting foundry for large-scale production of components of meters. (E13, T1; Al)

524-E. Pressure Die Casting of Zinc in the Necchi Foundry. *Machinery,* v. 92, May 30, 1958, p. 1292-1295.
(E13; Zn)

525-E. Spheroidal Graphite Cast Iron Made by Calcium and Calcium Alloy Additions. Takaji Kusakawa. *Waseda University, School of Science and Engineering, Memoirs,* no. 21, 1957, p. 144-158.
(E25q; CI-r)

526-E. Shell Molding. R. D. Winter. *Wisconsin Engineer,* Apr. 1958, p. 24-27, 58-59.
Development and applications of semi-precision shell molding. (E19c)

527-E.* (German.) **Experimental Production of Binders for Shell Molding.** Manfred Lottermoser. *Giesserei,* v. 45, May 22, 1958, p. 304-307.
Croning method of shell production; properties of binders. Suitability of various synthetic thermosetting resins. Russian experiments with wood pitch. Experiments with pitch binder containing sulphur.
(E19c; NM-f45)

528-E.* (German.) **Use of Pressed Board in Pattern Making.** Fritz Härtling. *Giesserei,* v. 45, May 22, 1958, p. 311-313.
General technical data; applications, machining and gluing, edge protection, assembling. (E17)

529 E.* (German.) **Pattern Designing as Regard to Requirements of Coremaking and Molding.** Heinrich Kmoch. *Giesserei,* v. 45, May 22, 1958, p. 313-315.
Construction of pattern; forming of core-prints; core-prints on plane parallel to separating line; core-prints for chaplets parallel to separating line. (E17, E21, 17-51)

530-E. Non-Ferrous Foundry Practice. G. C. S. Webster. *Engineer and Foundryman,* v. 22, Feb. 1958, p. 45-52.
Production of Cu-base, Al and Ni alloys; molding and melting practice; some types of melting units; importance of gas-free metal for consistent results from separately cast test bars.
(E10, 1-52, E19; Cu-b, Al-b, Ni-b)

531-E. The Foundry Industry in South Africa. H. J. Van Eck. *Engineer and Foundryman,* v. 22, Feb. 1958, p. 76-80.
(E-general)

532-E. Metallurgical Progress in the Iron Foundry. W. W. Braidwood. *Engineer and Foundryman,* v. 22, Feb. 1958, p. 81-85, 92.
14 ref. (E-general; CI)

533-E. Dry Hearth Furnace Speeds Production of Aluminum Castings. F. L. Turk. *Industrial Heating,* v. 25, June 1958, p. 1138, 1140, 1142.

Aluminum melted on sloping hearth flows to a holding bath for ladling. 4 ref.

(E10b, E23, W18; Al, 5-60)

534-E. Designing Vacuum Plaster Mold Castings. W. G. Wilkins. *Machine Design,* v. 29, Nov. 28, 1957, p. 106-108.

(E16a, 1-73, 17-51)

535-E. Alloys for Making Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Machinery Market,* v. 2979, Dec. 19, 1957, p. 22-24.

Recent developments in Cu and Al casting alloys. (To be continued.) (E-general; Cu-b, Al-b)

536-E. Alloys for Making Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Machinery Market,* v. 2978, Dec. 12, 1957, p. 25-26.

Development in cast iron. (To be continued.) (E-general; CI)

537-E. Shell Molding. Negley Monett. *Pacific Factory,* v. 89, Apr. 1958, p. 26-27, 56.

(E19c)

538-E.* Cast Die Cavities. Pt. 1. Irwin Lubalin. *Precision Metal Molding,* v. 16, July 1958, p. 24-25, 52.

Toolsteel dies cast by the Shaw process have advantages over those produced by sand casting, shell molding or the lost wax processes. (E19, W19n; TS)

539-E.* Electric Melting and Holding of Aluminum. Herbert Chase. *Precision Metal Molding,* v. 16, July 1958, p. 30-31, 60.

Briggs & Stratton Corp. uses battery of 14 induction melting furnaces for die casting Al alloys. They have a power rating of 100 kw. each and an hourly melting rate of 500 lb. (E10r, 1-69, E13; Al)

540-E. Are You Buying Tolerances You Don't Actually Need? William O. Sweeny. *Precision Metal Molding,* v. 16, July 1958, p. 26-27, 46-47.

Close tolerances in investment castings are to be balanced against increased costs. Cost savings can often be realized and greater accuracy achieved by finish machining. (E15, 17-53)

541-E. Russian Automated Precision Casting Plant. Peter Trippe. *Process Control and Automation,* v. 5, Apr. 1958, p. 158-163.

(E15, 18-74)

542-E. (Russian.) **New Machines and Appliances for Die Casting.** V. M. Plyatskii. *Vestnik Mashinostroenia,* May 1958.

(E13, 1-52)

543-E.* (Book.) **A Practical Guide to the Design of Steel Castings.** 52 p, 1958. British Steel Castings Research Association, East Bank Rd., Sheffield 2, England. 12s/6d.

Designs for steel castings which faciiltate molding, feeding and pouring that reduce the incidence of defects such as shrinkage cavities, tears, contraction cracks, pinholes and blowholes; unsatisfactory designs. (E11; ST, 17-51)

544-E. Progress in Iron Castings. H. Bornstein. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 1-16.

Review of casting practice in the U. S. over past 40 yr.

(E-general, A2; CI)

545-E. Austenitic Manganese Steel Technology in an Australian Foundry. Hedley Thomas. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 36-40.

(E-general; SS-e, *Mn*)

546-E.* Effect of Ferrosilicon and Magnesium Inoculation on Nuclei Formation in Cast Iron. Fredrik Hurum. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 66-74.

Examination of the process whereby ferrosilicon absorbs iron from the melt prior to dissolving. Three phases, epsilon (FeSi), alpha (silicoferrite) and gamma (silico-austenite) were formed. Results of further studies of graphite spherulites. (E25q, CI-r)

547-E.* Effect of Temperature on the pH of Foundry Sands. N. D. Brinkmann and Gordon Gottschalk. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 84-87.

Apparently calcium carbide present in particles of sea shells in sand changes to calcium oxide at 1500°, resulting in marked change in pH. Rise in pH is associated with decrease in physical properties of baked cores. (E18r, 2-61)

548-E. European Foundries and Pattern Shops. E. T. Kindt. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 94-96.

(E-general, 18-67)

549-E.* Hot Tearing of Magnesium Casting Alloys. R. A. Dodd, W. A.

Pollard and J. W. Meier. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 100-117.

Susceptibility to hot tearing of Mg-Al and Mg-Zn alloys containing up to 10% alloying additions, and of 17 other important Mg alloy compositions determined by various methods, involving measurement of the cracking tendency of flat rings cast in steel or sand molds. 39 ref. (E25, 2-60; Mg-b, 9-72)

550-E.* How to Determine Moisture Requirements of Molding Sands. R. W. Heine, E. H. King and J. S. Schumacher. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 118-122.

Water requirements for obtaining peak strength in molding sands are quantitatively related to the ingredients of the sand mixture. (E18p)

551-E.* Mold Hardness: What It Means! R. W. Heine, E. H. King and J. S. Schumacher. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 123-127.

Basic relationship of mold hardness to green strength. The relationship is generally applicable to clay-saturated sands. In clay-poor sands, the relationship depends on clay content and factors influencing clay distribution. 5 ref. (E18r, E19)

552-E.* Correlation Between Casting Surface and Hot Properties of Molding Sands. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 128-133.

Two simple one-specimen tests to measure scabbing, buckling and rat-tailing tendencies of molding sands for iron casting. (E18r)

553-E.* Effects of Charge Materials and Melting Conditions on Properties of Malleable Iron. E. H. Belter and R. W. Heine. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 134-139.

Annual progress report on A.F.S. malleable iron research project. Effect of pig iron variations in the charge on the casting properties, mechanical properties and annealability of malleable iron; variations in melting technique in an effort to change residual element recovery after melting; correlation of Si oxidation with changes in residual element recovery; effect of holding time at 2800° F. on the mechanical properties. 9 ref. (E10, CI-s)

554-E.* Influence of Sand Grain Distribution on Green-Sand Casting Finish. C. E. McQuiston. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 188-206.

The mean sand grain diameter is the most important factor contributing to roughness. The spread contributes to roughness but to a lesser degree than the mean diameter. The effect of squeeze pressure on roughness is minor in the range of this experiment. 31 ref. (E18r)

555-E.* Fluidity of a Series of Magnesium Alloys. J. E. Niesse, M. C. Flemings and H. F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 207-211.

Fluidity of Mg-rich portions of seven different Mg alloy systems presented as a function of composition. Data for both constant superheat and constant pouring temperature. Addition of Zr to Mg alloys lowered the fluidity at low alloy content, but slightly raised the fluidity at alloy contents above 4%. 5 ref. (E25p, 2-60; Mg-b)

556-E. Efficient Cupola Operation. *Australian Manufacturer,* v. 42, Mar. 1, 1958, p. 60-65, 70.

Interdependent factors affecting cupola operations such as types of lining, cokes, sulphur in the cast iron, fluxes and tuyere design. (E10a)

557-E.* Desulphurization of Iron and Steel. Pt. 1. S. L. Gertsman. *Canadian Metalworking,* v. 21, June 1958, p. 33-35, 37.

More scrap iron may be used in the cupola if the sulphur is reduced; there is less danger of producing iron with an improper Mn:S ratio; less Mn can be used for steel; hot tearing characteristics of cast steels are associated with sulphur content. High sulphur appears to increase the tendency toward hot tearing. (E10a, E25; CI, ST)

558-E. Molding Castings for Rolling Stock. J. G. H. Loubser. *Engineer and Foundryman,* v. 22, Feb. 1958, p. 99-107.

(E19, T23)

559-E. Shell Molding—Automated. T. E. W. Preston. *Metalworking Production,* v. 102, June 6, 1958, p. 983-991.

Application of shell-molding technique with a comparatively simple electro-pneumatic system of control. (E16c; 18-74)

560-E. Investigations on the Effect of Heat on the Bonding Properties of Various Bentonites. Franz Hofmann. *Modern Castings,* v. 34, July 1958, p. 31-37.

6 ref. (E18n)

561-E. Gating and Risering Shell Mold Pattern Equipment. D. C. Kidney. *Modern Castings,* v. 34, July 1958, p. 38-40.

(E16c, E22p, E22q)

562-E.* Sodium Silicates for the CO_2 Process. E. A. Lange and R. E. Morey. *Modern Castings,* v. 34, July 1958, p. 41-49.

Chemistry of the CO_2-sodium silicate process for bonding foundry sand. The amount of CO_2 necessary to develop maximum gassed strength is that required to increase the SiO_2 to Na_2O ratio of the sodium silicate to 4. The efficiency of the CO_2 gassing process can be greatly increased by diluting the CO_2 with air. (E18n)

563-E.* Foundry Applications of the Calcium Carbide Injection Process. W. R. Lysobey and A. E. Tull. *Modern Castings,* v. 34, July 1958, p. 53-61.

Injection of calcium carbide in cast iron will reduce chill formation and promote the formation of Type-A graphite in a pearlitic matrix. The extent of the calcium carbide injection treatment required to produce the optimum physical properties and microstructure will depend upon iron composition and solidification rate. (E25q; CI)

564-E.* Performance of Chills on High Strength Magnesium Alloy Sand Castings of Various Section Thicknesses. Merton C. Flemings, Richard W. Strachan, Ernest J. Poirier and Howard F. Taylor. *Modern Castings,* v. 34, July 1958, p. 62-69.

Effect of section thickness and chilling on the mechanical properties of sand cast Mg alloy test plates. The alloys studied were AZ92A and AZ91C. Plate thickness was varied from ¼ to 1½ in. (E22r; Mg-b)

565-E.* (French.) What Causes Pinholes? S. A. Sanders. *Fonderie,* v. 145, Feb. 1958, p. 53-63.

Thermodynamic study indicates that hydrogen dissolved in steel does not create sufficient gas pressure to form cavities and that no hydrogen-oxygen reaction accompanies formation of steam. Probable cause of pinholes is carbon oxide which forms as by reaction of carbon in steel with iron oxide formed at mold-metal interface. (Pinholes do not form in presence of Al in solution because oxygen reacts with Al rather than with carbon). Theory is advanced that many so-called pinholes should be classified as inclusions. Cermet-type inclusions, also called ceroxides, and their influence on pinhole porosity. 19 ref. (E25, 9-68, 9-69; ST)

566-E.* (French.) Oxygen in the Cupola. Francois Danis. *Fonderie,* v. 145, Feb. 1958, p. 79-86.

Super-oxygenation of blast increases hourly production, decreases percentage of loss of Si, improves castability of melt. Addition of oxygen apparently has no effect on carburization and loss of Mn during melting. (E10d; ST)

567-E.* (French.) Influence of Rate of Air Supply, Coke Size and Coke Rate Between Charges on Cupola Operation. Francois Danis and Maurice Decrop. *Fonderie,* v. 148, May 1958, p. 215-233.

Thermal balance sheets and productivity of cupola (700 mm. nominal i.d.) for varied operating conditions during 19 experimental melts. All materials charged into cupola, all products of fusion were carefully measured and analyzed; constant check of temperatures was maintained. The 90-120 coke appears to be best suited for standard, foundry-size cupola. (E10a; RM-j43, CI)

568-E. (German.) Fluid Dynamics Applied to the Construction of Die Casting Dies for Aluminum Die Casting. Hermann Kessler. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 250-256.

Flow of molten metal into die casting dies; vacuum die casting process. (E13, 1-73, W19n)

569-E.* (Japanese.) Segregation in Castings. Pt. 8. Kazuo Yasuda. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 379-385.

Basic experiments on segregation conducted to substantiate theoretical mechanism of the shape of segregation curves. When the size of castings was reduced the flat portion of the segregation curve corresponding to the intermediate layer of castings was lower and the degree of segregation decreased. Segregation in cylindrical castings was higher than in flat castings. 6 ref. (E25n, 9-69)

570-E.* (Japanese.) **Study on the Shell Molding Process. Pt. 1. Influence of Thickness and Bending Strength of Shell.** Hideji Hotta. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 385-394.

Influence of kinds of silica sands, additional amounts of synthetic resins and wetting agents on temperature, time of setting on the curing of shell molds and bending strength and thickness. Both the thickness and the bending strength of shell become greater as the setting temperature, time and the curing temperature become greater. 12 ref. (E19C)

571-E.* (Japanese.) **Studies of Foundry Silica Sands. Pt. 4. Crushing of New Foundry Silica Sands.** Umeji Harada and Keizo Nishiyama. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 395-405.

Geological origin, crystal structure, hot properties and refractory properties of four silica sands. Crushing method is by ramming. Grain sizes of the sands are 35, 48, 65, 100 and 150 mesh. (E18r)

572-E.* (Japanese.) **Binding Materials for Foundry Sand. Inorganic Binders.** Hiromu Tanimura and Shizuo Mukae. *Japan Foundrymen's Society, Journal,* v. 30, May 1958, p. 405-417.

Clays were submitted to chemical analysis, X-ray analysis, electron microscopy and differential thermal analysis, while their swelling capacity, base exchange capacity, pH value and others were measured and correlated with binding capacity. 17 ref. (E18n)

573-E.* (Spanish.) **Porosity in 85-5-5-5 Type Bronze Castings.** Sebastian F. Matas. *Revista de Ciencia Aplicada,* v. 12, Mar-Apr. 1958, p. 136-144.

Contraction during solidification, gases, metal-mold reaction as principal causes of porosity. Means of reducing porosity. Need for further study of such factors as compatibility of 85-5-5-5 bronze and mold materials, metal-mold reaction, control of absorbed gases, amount of phosphorus used for deoxidation, effect of binders and addition agents used in mold and core sand, degassing methods, crystal structure of alloy. 15 ref. (E25; Cu-s, 9-68)

574-E.* **Influence of Vibration on Solidifying Metals.** A. H. Freedman and J. F. Wallace. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 578-589.

Vibration applied to solidifying Al-Cu alloys refined grain size, improved tensile properties. Hypothesis offered to explain observations. 8 ref. (E25n; EG-a38)

575-E.* **Tin as an Alloy in Gray Cast Iron.** J. A. Davis, D. E. Krause and H. W. Lownie. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 590-597.

Tin contents of 0.10% or less resulted in slightly improved mechanical properties without producing any undesirable properties. No embrittling effects of Sn were found at levels up to 0.10%, and it is in this range that Sn had its major beneficial effects upon microstructure and mechanical properties. (E25q; CI-n, Sn)

576-E.* **An Appraisal of Steels for Aluminum Die Casting Dies.** J. C. Hamaker and G. A. Roberts. *Die Casting Engineer,* v. 2, June 1958, p. 11-13.

Causes of heat checking, pitting, impingement soldering; requirements of a good die casting steel; precautions for maximum die life. (E13; SS)

577-E. (German.) **Prevention of Casting Defects.** Hans Reininger. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 137-142.

Proper gating assures uniform heating and cooling in the most intricate parts and eliminates defective hardening. Model altering and use of chills in the critical parts also advised. After annealing slowly cooling prevents overhardened surfaces. The growth of metal at high temperatures can be avoided by use of cast iron of high heat stability. Fine-grained graphitic hard iron advised ferritized through afterward annealing. At lower temperatures (e.g., up to 500° C.) certain alloying elements such as Cr, Mn, V, act as stabilizators. Examples are from the practice with micrographs and illustrations. (E-general)

578-E.* (German.) **Investigation on the Use of Calcium Carbide in Cupola Furnace Operation.** Kurt Giesen. *Giesserei-Praxis,* v. 76, June 10, 1958, p. 219-222.

A report on the use of a specially developed calcium carbide for cupola furnace work. Data show that addition of carbide increases the flow temperature of the iron without increasing the sulphur content and

lowers sulphur content up to about 35% if the usual melting temperature is maintained. 11 ref. (E10a; AD-a)

579-E.* (Italian.) **Improvements in Cupola Operation. Results Obtained From a Basic Cupola.** Mario Olivo. *Fonderia,* v. 7, Apr. 1958, p. 137-142.

Conversion of standard foundry cupola from acid to basic process, using cold blast, with no forced cooling between melts, resulted in following advantages: almost total elimination of shrinkage cavities in castings; elimination of slag formation in ladle; cast iron of high machinability even when Si content is low; improved mechanical properties of product; possibility of refining charges composed of low-grade miscellaneous cast iron scrap, scrap iron and steel, with almost total elimination of pig iron requirement; reduced manufacturing costs due principally to possibilities of using less expensive charges. Suggestion is made that cupola with I. D. of 800 mm. or more be adopted to make application of refractory linings easier and melting more even, and to avoid formation of abundant and not always fluid slag. 12 ref. (E10a)

580-E. Pressure Tightness in 85-5-5-5 Bronze Castings. P. K. Trojan and R. A. Flinn. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 238-246.

To investigate the basic nature of leakage under pressure for this material and to evaluate the effects of melting and molding variables, a sensitive and reproducible test bar and leak test procedure have been developed. 5 ref. (E11; Cu-S)

581-E.* Investigation of Metallurgical and Mechanical Effects in the Development of Hot Tearing. H. F. Bishop, C. G. Ackerlind and W. S. Pellini. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 247-258.

The contraction characteristics of metals in sub-solidus temperature ranges is an important factor in development of either adverse or beneficial mechanical conditions with respect to hot tearing. 7 ref. (E25n, 9-21)

582-E.* Performance of Chills on High Strength-High Ductility Sand-Mold Castings of Various Section Thicknesses. M. C. Flemings, P. J. Norton and H. F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 259-266.

Data showing effect of casting thickness on ability of chills to increase mechanical properties of cast Al alloy sections varying from ¼ to 1½ in. thick; data on end-chilled plates of 195 and 356 alloys. Mechanical properties of the end-chilled plates decrease with increasing distance from the chills. 6 ref. (E22r, 5-66, Al-b)

583-E. Gating of Gray Iron Castings. J. F. Wallace and E. B. Evans. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 267-275.

(E22p; CI-n)

584-E. Temperature Drop in Pouring Ladles. Pt. 2. V. Paschkis and J. W. Hlinka. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 276-281.

(E23)

585-E.* Effect of Small Tin and Cadmium Additions to Aluminum-Copper Alloys. H. V. Sulinski, R. C. Harris and S. Lipson. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 282-291.

The effect of small quantities of Sn and Cd on the aging characteristics and tensile properties of cast and heat treated Al-Cu alloys centering around the commercial 195 alloy composition (Al-4.5% Cu). Results suggest that the Sn additions are slightly more effective than the Cd. 19 ref. (E25; Al-b, Cu-b)

586-E. Practical Studies of Veining Tendencies. George Di Sylvestro. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 323-339.

The following factors promote or affect veining in steel castings: increased gas evolution; variations in raw materials; coarser sand; insufficient venting; insufficient baking; silica flour additions. The veining defect may be improved by the use of a test casting as a standard for comparison, quality control of raw materials, and use of finer sand, iron oxide, bentonite, fire clay, and core binders with a low gas content and rate of evolution. (E18r)

587-E.* Inoculation of Gray Cast Iron. N. C. McClure, A. U. Khan, D. D. McGrady and H. L. Womochel. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 340-349.

The most effective inoculant for the improvement of mechanical properties in these experiments was the Ca-Si alloy with approximately 30% Ca. Ca additions effected a reduction of the carbon content of molten iron by formation of a carbide of low solubility; it is suggested that calcium carbide is involved in the mechanism of Type-A graphite formation. 9 ref. (E25q; CI-n, *Ca, Si*)

588-E. Hydrogen as It Affects Steel Castings. Arthur F. Gross. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 365-373.

Through proper melting control the steel foundryman can eliminate any permanent defects attributable to hydrogen. The loss of tensile ductility is a temporary effect which eventually disappears on natural aging and may be quickly eliminated by artificial, low-temperature aging treatments. Hydrogen embrittlement does not make the steels notch sensitive. Flaking as a result of hydrogen is seldom if ever encountered in castings. (E25; ST, 9-68)

589-E.* Mechanical Properties of Cast Titanium-Iron and Titanium-Aluminum-Iron Alloys. N. Hehner, H. W. Antes and R. E. Edelman. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 374-378.

An investigation to determine the as-cast tensile and impact properties of Ti-Fe and Ti-Al-Fe cast alloys. The tensile strength of both binary and ternary alloys increased appreciably as the Fe content was increased. Results indicate that a Ti-3% Al-5% Fe would be particularly amenable to heat treatment. 10 ref. (Q21, Q27a; Ti-b, Al, Fe)

590-E.* Effect of Various Clays and of Tempering Method on Sand Properties and Casting Quality. A. E. Murton. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 379-385.

Four commercial foundry bonding clays were tested to determine the properties they would produce in foundry sand mixtures. The clays tested were western and southern bentonite, Ohio fire clay, and Illinois illite. 6 ref. (E18r)

591-E.* Feed Metal Requirements for Ductile Iron Castings. C. Reynolds, J. Maitre and H. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 386-390.

Precipitating graphite is beneficial in lowering feed metal requirements, and if present in sufficient amount many castings can be made in rigid molds without risers. The main effect of increasing silicon is allowing more graphite to precipitate because of the decreased solubility of carbon in austenite. (E23; CI-s)

592-E. Transport of Feed Metal During Solidification of Tapered Steel Bars. E. J. Sullivan, C. M. Adams and H. F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 394-401.

Experimental and theoretical studies of the padding requirements for cylindrical cast plain carbon steel bars. 9 ref. (E23; ST-a)

593-E. Properties of Molding Sands Under Conditions of Gradient Heating. N. C. Howells, R. E. Morey and H. F. Bishop. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 402-408.

A new hot strength test used on molding and core sands. Various mixtures were tested under conditions which represent mold interface regions for castings that solidify in the vicinity of 2000 to 2400° F. 6 ref. (E18r)

594-E.* Investigation of the Effect of Processing Variables on Mechanical Properties of Pearlitic Malleable Iron. H. H. Johnson and W. K. Bock. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 450-461.

Statistical study of atmosphere, tempering time and temperature, quenching time, temperature and rate and other variables on mechanical properties. (E25; CI-s)

595-E.* Vacuum Die Casting. David Morgenstern. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 494-498.

Use of a vacuum box around the die, rather than locating the vacuum within the die, permits more rapid operation, minimizes air entrapment, improves mechanical properties of casting. (E13, 1-73)

596-E. Status of the Technology for Casting Titanium. G. H. Schippereit, R. M. Lang and J. G. Kura. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 499-512.

Survey of furnace types, molds, precision casting, properties of cast alloys, potential market, availability. 36 ref. (E-general; Ti)

597-E.* The Use of Expendable Graphitic Molds in the Production of Sound, Ductile Titanium Castings. A.

L. Feild and R. E. Edelman. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 517-522.

These molds can be made using conventional foundry techniques. The molds are expendable, economical to produce, and strong. In addition, molten Ti metal poured in section thicknesses as great as 2 in. will not be contaminated by the mold material. (E19; Ti-b, NM-k36)

598-E. "Slice 'em Yourself" Castings. *American Machinist,* v. 102, June 1958, p. 76-77.

Continuously cast Cu alloy rods, tubes and shapes up to 12 ft. long can be cut apart into individual castings. All standard tin-bronze alloys, including Pb, Zn and Ni, bearing varieties, can be cast to size. (E-general; Cu)

599-E. The Ford "Thames" Foundry. *Automobile Engineer,* v. 48, June 1958, p. 233-246.

New Ford Motor Co. foundry in England produces four-cylinder and six-cylinder engine blocks and heads. About 42 different castings are handled. Equipment and layout. (E-general, T21b; 18-67)

600-E.* Kinetics of Alloy Solidification. K. A. Jackson. *Canadian Journal of Physics,* v. 36, June 1958, p. 683-691.

Alloy systems discussed in terms of the theory of interface kinetics. The nonequilibrium equations which are developed reduce to the thermodynamic expressions if the system is in equilibrium. Several types of phase diagrams are discussed. It is shown that a phase diagram gives a reasonably good estimate of the concentrations at an interface if the system is not in equilibrium. (E25n, M24)

601-E. High Temperature Tooling for Die Casting. E. E. Hall. *Die Casting Engineer,* v. 2, Mar. 1958, p. 10-11, 22.

Briefly related chemical composition of hot work toolsteels with minimum distortion during heat treatment. Resistance to heat checking, toughness, wear resistance, resistance to softening, thermal conductivity and other properties necessary for die casting die materials. (E13, W19n; TS)

602-E. Solve Your Die Temperature Control Problems. H. A. Meyrick. *Die Casting Engineer,* v. 2, Mar. 1958, p. 12-13.

Variation of die casting die temperature with pressure, time and metal temperature; control of die temperatures by system employing high velocity circulation of a control temperature liquid. (E13, W19n, 2-61)

603-E.* Steps to Take in Eliminating Hot Tears. Hubert Chappie. *Foundry,* v. 86, July 1958, p. 82-84.

Experiences with large castings of 0.40 carbon steel. Corrective actions required to avoid hot tears included use of wood flour, multiple gating, external chills, staggering of ribs, control carbon content. (E-general; CN, 9-71)

604-E. Mechanized Molding Line Produces Gray Iron Brake Drums. Robert H. Herrmann. *Foundry,* v. 86, July 1958, p. 90-93.

(E19; CI)

605-E. The Importance of Clay Particle Size. Walter E. Gruver. *Foundry,* v. 86, July 1958, p. 94-96.

Relation of clay particle size to properties of foundry sands; method for size determination. (E18r)

606-E. Gray Iron Foundry Pursues Continued Plant Improvement. Kenneth L. Mountain. *Foundry,* v. 86, July 1958, p. 98-101.

At the Inter-State Foundry Co., Indianapolis. (E-general; 18-67, CI-n)

607-E.* The Establishment of Dimensional Norms for Die Castings. H. K. Barton. *Machinery,* v. 92, no. 2359, Jan. 31, 1958, p. 267-276.

Tolerances are discussed at length, with particular reference to standards introduced by the Zinc Alloy Die Casters' Association for the guidance of British designers and buyers. Short history of the die casting industry; tendency for users of die castings to "over specify" is discussed. Factors which affect the dimensional accuracy and the A.D.C.I. tolerances. (E13, A2, S22)

608-E. Die Cast Record Changer. *Metal Industry,* v. 92, June 20, 1958, p. 511-513.

Die casting practice at Collaro Ltd. in the production of cam gear, spigot housing and turntable bosses for record changers. (E13, T10c)

609-E. Investment Casting in Europe. H. J. Marshall. *Precision Metal Molding,* v. 16, June 1958, p. 24-26.

(E15)

610-E. A Vacuum System for Die Casting Aluminum. G. R. Morton. *Precision Metal Molding,* v. 16, June 1958, p. 30-32.

(E13, 1-73; Al)

611-E. (French.) **Future Progress in the Melting of Metals.** Frank Hudson. *Fonderie Belge,* v. 28, May 1958, p. 154-162.

Fuels and melting furnaces; use of hydrogen, oxygen and nitrogen. (Conclusion.) 10 ref.
(E10, W18, RM-j, RM-k, RM-n)

612-E.* (Italian.) **Testing of Oily Sand Binders.** Rinaldo Cattaneo. *Fonderia,* v. 7, May 1958, p. 201-208.

Procedures and equipment for determining viscosity, specific weight and iodine number of binders; significance of these properties. (To be continued.) (E18n)

613-E.* (Italian.) **Formless Refractories for Foundry Use.** Luihi Ferro. *Fonderia,* v. 7, May 1958, p. 209-214.

Bulk refractory materials were formed into test pieces. Behavior of basic and acid mixtures, both green and baked, under slag erosion and hot and cold compression tests. High resistance of a basic mixture to an acid slag was noted.
(E10; RM-h)

614-E.* (Russian.) **Modification of Heat Resistant Al-Si Alloys.** T. I. Orlova. *Liteinoe Proizvodstvo,* Apr. 1958, p. 31-32.

Through small addition of B, Ti and P to hypereutectic Al-Si alloys it becomes possible to use alloy for casting pistons which are highly heat resistant, readily machinable, and can be produced very cheaply. 12 ref.
(E25q, T21b, 2-60; Al, Si, *B, P, Ti*)

615-E.* Decarburization of White Irons Under Non-Graphitizing Conditions. C. T. Moore. *B.C.I.R.A., Journal of Research and Development,* v. 7, June 1958, p. 258-261.

In white irons, carbide solution in austenite is a limited factor influencing the rate of carbon removal by gaseous decarburization. Free iron sulphide also seems to reduce the rate of solution of carbide in austenite. (E25; CI-p)

616-E.* Some Factors Influencing the Incidence of Inverse Greyness in White Irons. C. T. Moore. *B.C.I.R.A., Journal of Research and Development,* v. 7, June 1958, p. 262-267.

The effect of ladle additions of B, Bi and ferromanganese, and the effect of sulphur content of the molding sand, on the incidence of inverse grayness in a blackheart malleable iron.
(E11, E25; CI-p, AD-p)

617-E.* Dross Defects in Nodular Iron Castings. A. G. Fuller. *B.C.I.R.A., Journal of Research and Development,* v. 7, June 1958, p. 268-285.

Ladle additions of tellurium in conjunction with cerium have potent effect in reducing dross defects. Control of Mg alloy addition and of Al content is necessary. Other factors include coal dust and moisture content of green sand molds, type of molding material, inoculant used, pouring temperature and gating system. (E11, E25, CI-r, AD-p)

618-E.* (German.) **New Ways of Using Precision Casting.** A. Krekeler. *Industrie-Anzeiger,* v. 80 June 3, 1958, p. 639-641.

Precision casting is used for parts difficult to manufacture by conventional means. An example taken from the turbine field shows that with the aid of pattern assembly it is possible to produce items which were outside the scope of conventional machining methods. Applications include complicated tools in high speed steel, rocket engines, turbines, compressors. 6 ref. (E15)

619-E. Mechanized Manufacture of Flaskless Carbon Dioxide-Waterglass Foundry Molds. K. Haake. *Giessereitechnik,* v. 3, no. 9, 1957, p. 193-197. (Henry Brutcher, Altadena, Calif., Translation no 4213.)

Report on mechanized sand drying and cooling installation and the manufacture of molds and cores by the carbon dioxide-waterglass process without the use of flasks. Foundry mechanization program. Centralized supply of carbon dioxide in foundry. Percentage data on economics of a change-over from green molds made in flasks. Plan for completely mechanized operation.
(E18n, E19, W19g)

620-E. Controlled Gas Content in Foundry Work. E. Scheuer. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 534-542.

Laboratory tests indicated that gas content of the melt is the critical factor in control of surface shrinkage effects. A hydrogen bubbler was designed to regulate this content. 14 ref. (E25s; Al-b)

621-E. Carbon Refractories. Gordon B. Tatum. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 543-549.

Various carbon shapes used for refractory lining in the foundry. For

lining cupolas certain combinations of materials are most satisfactory for particular cupola designs and operating conditions. Construction and maintenance features.
(E-general, 1-52, RM-h 39)

622-E. Rigging Design of a Typical High Strength, High Ductility Aluminum Casting. Merton C. Flemings, Patrick J. Norton and Howard F. Taylor. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 550-555.

By careful control of chilling and other variables in casting of Al, ultimate tensile strength is increased up to 95%, yield strength up to 63% and elongation, 1300%. 4 ref.
(E22, Q27a; Al-b)

623-E. Link-Belt's New Foundry Provides Efficient Operations. Robert H. Herrmann. *Foundry,* v. 86, Aug. 1958, p. 40-47.

Standard and pearlitic malleable castings weighing up to 70 lb. are produced in green sand and shell molds in this recently completed mechanized foundry.
(E11, E16c, 18-74; CI-s)

624-E. Controlling Casting Quality Through Sand Testing. Harry W. Dietert. *Foundry,* v. 86, Aug. 1958, p. 58-61.

Two elevated-temperature tests allow determination of tendency of a given sand to cause slabs, rat-tails or buckles. (E18r)

625-E. (German.) **Metal Melting in Medium Frequency Induction Furnaces.** H. Kluge. *Giesserei-Praxis,* v. 76, Apr. 10, 1958, p. 123-126.

(E10r, 1-69)

626-E. (German.) **Economy and Cost Calculation in the Foundry.** A. Hohmann. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 142-145.

(E-general, 17-53)

627-E. (German.) **Durville Process Applied to Sand Casting.** Friedrich Reile. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 146-147.

(E19, E18)

628-E. (German.) **Development of the CO_2 Process.** A. Hohmann. *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 150-151.

(E18n)

629-E. (German.) **Steel Castings.** Fr. Walter. *Industrie-Anzeiger,* no. 35, May 2, 1958, p. 19-21.

(E-general; ST)

630-E. (German.) **"Heavy" Light Metal Casting.** Wolfgang Buechen. *Industrie-Anzeiger,* no. 35, May 2, 1958, p. 30-31.

(E-general; Al, Mg, Ti)

631-E. (German.) **Production and Application of Nodular Cast Iron.** H. Timmerbeil. *VDI-Berichte,* v. 27, 1958, p. 29-38.

Four production methods; application for heat resistant castings. 4 ref. (E-general, CI-r)

632-E.* (Italian.) **Desulphurization in the Furnace by Means of Soda.** Enrico Balzarini. *Fonderia,* v. 7, Apr. 1958, p. 152-154.

Elimination of sodium carbonate from cupola charge made very little difference in sulphur and total carbon contents of white cast iron and made possible direct pouring from cupola at sufficiently high temperature to produce iron of low sulphur content. (E10a; CI-p, AD-a)

633-E. (Italian.) **Application of Statistical Quality Control in the Investment Casting Process.** G. Postogna. *Fonderia Italiana,* v. 7, Feb. 1958, p. 57-61.

(E15, S12)

634-E. (Italian.) **Plant Design for Mechanized Foundries.** Guglielmo Somigli. *Fonderia Italiana,* v. 7, Mar. 1958, p. 88-98.

(E-general, 18-67, 18-74)

635-E. (Italian.) **Modernization and Mechanization of an Ingot Mold Foundry. Sand Processing, Molding, Organization.** Aldo Rege and Nicola Monniello. *Fonderia Italiana,* v. 7, Mar. 1958, p. 99-104.

(E-general, W19c, 18-74)

636-E. (Italian.) **Statistical Quality Control in the Foundry.** Roberto Sacerdote. *Fonderia Italiana,* v. 7, May 1958, p. 169-172.

(E-general, S12)

637-E. From Conventional Lined Cupola to Liningless Hot-Blast Cupola. E. L. W. Löbbecke. *British Foundryman,* v. 51, July 1958, p. 331-339.

Results of recent research and practical experience with liningless cupolas and their characteristic melting technique. 10 ref. (E10a)

638-E. Some Notes on the Shell-Moulding Process. T. H. Weaver. *British Foundryman,* v. 51, July 1958, p. 343-347.

Applications of the shell-molding process for different types of casting in various materials. (E16c)

639-E. S. G. Iron-Foundry Technology. D. K. Coutts and S. A.

Anant. *Indian and Eastern Engineer,* v. 122, Apr. 1958, p. 267, 269, 270.

Foundry technology for spheroidal graphite cast iron. (E-general; CI-r)

640-E. (German.) **Automation in Foundries.** Paul Schiegries. *Giesserei,* v. 45, June 19, 1958, p. 363-365.

Competitive processes of fabrication; bath-tub fabrication; American methods. (E-general, 18-74)

641-E. (German.) **A Modern Melting Plant for Cast Iron.** Victor Frey. *Giesserei,* v. 45, July 3, 1958, p. 397-402.

(E18, W18; CI)

642-E. (German.) **Molding Sand Mixtures.** Hans Reininger. *Giesserei-Praxis,* no. 13, July 10, 1958, p. 255-259.

Blanzer green sand + quartz sand, Blanzer sand + fireclay, fireclay + quartz sand, sieved fireclay + Blanzer sand; magnesite + quartz sand, magnesite + Blanzer green sand, mixtures with used sand. (E18p)

643-E. (German.) **Modern Statistical Control in Foundry Work.** A. Hohmann. *Giesserei-Praxis,* no. 13, July 10, 1958, p. 259-261.

(E-general, S12)

644-E. (German.) **Resins for Models, Pattern Plates and Core Boxes.** H. Kalpers. *Giesserei-Praxis,* no. 13, July 10, 1958, p. 262-265.

(E17, E21; NM-d)

645-E. (German.) **New Developments in Casting and Molding.** K. Strauss. *Technik und Betrieb,* v. 10, June 1958, p. 82-83.

Croning method, CO_2 hardening, precision casting, Shaw method. (E-general)

646-E. (Russian.) **Mechanization of Plate Production for Magnesite-Chromite Cupolas.** V. P. Emel'yanov. *Metallurg,* v. 3, May 1958, p. 20-24.

(E10a, 18-74; ST, 4-53)

647-E.* **An Appraisal of Steels for Aluminum Die Casting Dies.** J. C. Hamaker and G. A. Roberts. *Die Casting Engineer,* v. 2, June 1958, p. 11-13.

Requirements for properties of good die steels; three principal types of failure—heat checking, pitting and impingment soldering. (E13, W19n; Al, ST)

648-E.* (French.) **Use of Fluxes in Melting of Light Alloys.** Fernand Dabel. *Revue de l'Aluminium,* v. 35, May 1958, p. 555-563.

Use of various fluxes to cope with problems arising in Al melting; fluxes to eliminate porosity and give suitable surface stage; solid and gaseous fluxes to eliminate occluded gas and refining fluxes for coarse grain. (E10, E25q, E25s; Al-b, RM-q)

649-E.* (German.) **Brinell Hardness of Aluminum Sand Castings From Scrap.** Hans Reininger. *Giesserei-Praxis,* no. 10, May 1958, p. 189-193.

Inapplicability of Rockwell's and Vickers' tests; examination of seven sources of error in Brinell and X-ray testing. (E11, Q29; Al, RM-p)

650-E. **Co_2 Process for Experimental Castings.** *Australasian Manufacturer,* v. 43, June 28, 1958, p. 76-77. (E18n)

651-E. **Feeding Systems for Gravity-Die-Castings.** D. Miller. *Foundry Trade Journal,* v. 105, July 24, 1958, p. 109-111.

Principles in designing feeding systems. (E13, E22)

652-E. **Design of Die-Castings. Pt. 8.** H. K. Barton. *Metal Industry,* v. 93, July 18, 1958, p. 47-49.

Basic design principles, emphasizing that final design should be based on function, not preliminary sketches. (E13, 17-51)

653-E. **Investigation of Some New Zealand Sands for Foundry Moulding.** T. E. J. Scahill. *New Zealand Journal of Science,* v. 1, July 29, 1958, p. 342-360.

Physical and chemical properties investigated and compared with A.F.S. recommended properties to assess their suitability for molding purposes. (E18)

654-E. (German.) **Modern Drying of Ladles and Molds.** H. Herrmann. *Giesserei-Praxis,* no. 10, May 1958, p. 196-197.

Coke, oil, gas and electric resistance furnaces. (E-general, W19k, W19b, W19g)

655-E. (German.) **My Experience in Coremaking.** Otto Knitter. *Giesserei-Praxis,* no. 10, May 1958, p. 198-200.

Construction, preparation and maintenance of core flasks; materials for coremaking; composition and preparation of various molding compounds; drying of cores; defects and their causes. (E21)

656-E. (German.) **Dressing of Molds, Cores and Chills.** H. Kron. *Giesserei-Praxis,* no. 10, May 1958, p. 204-205.

Composition of white and black washes; manual and mechanical dressing; use of special mixers; appropriate dressing technique in case of molds, cores and chills. (E19)

657-E. (German.) **Production of Molds With Chemically Hardened Sands Without Use of Mold Boxes.** Miroslav Bednarik. *Giessereitechnik,* v. 4, Apr. 1958, p. 78-79.

4 ref. (E18n)

658-E. (German.) **Increasing Production of Circular Castings.** Heinz Kühne. *Giessereitechnik,* v. 4, May 1958, p. 106-107.

(E-general, A5)

659-E. (German.) **Elimination of Porosity of Cylinders by Use of Steel-Shot Cores.** Gerhard Blümel. *Giessereitechnik,* v. 4, May 1958, p. 112.

(E21, 9-68)

660-E. (Book.) **American Foundrymen's Society, Transactions,** v. 65, May 1957. 605 p. American Foundrymen's Society, Golf & Wolf Rds., Des Plains, Ill.

Proceedings of the 61st Annual Meeting, Cincinnati, Ohio, May 6-10, 1957. Papers abstracted separately. (E-general)

661-E.* **Application of Sodium Silicates for Bonding Sands.** F. W. Nield and David Epstein. *Castings,* v. 4, May 1958, p. 5-24.

Relationship between compression strength of sand bonded with sodium silicate cured with CO_2 or uncured and the grade of sodium silicate. concentration of sodium silicate time of CO_2 gassing and temperature to which specimen is subjected Conclusions concerning nature of bond. Relation between drying and compression strength and bench life of sodium silicate sand mixes. 4 ref. (E18n)

662-E.* (French.) **Zones of Influence of Risers. Possible Feed Distances and Effects. Pt. 1.** Richard Namur. *Fonderie Belge,* v. 28, June 1958, p. 191-193.

Mathematical study of solidification, contraction and compensation for contraction; general equations for zones of influence of risers; calculation of duration of freezing at a given point. (To be continued.) (E22q)

663-E.* (French.) **Zones of Influence of Risers. Possible Feed Distances and Effects. Pt. 2.** Richard Namur. *Fonderie Belge,* v. 28, July 1958, p. 209-219.

Applications of formulas presented in Pt. 1 to risers for feeding a flat plate and a square bar. Influence of superheating of molten metal, size of risers, and use of chills on feed distances. Contraction, solidification and heat transfer. 5 ref.
(E22q, E22r, E25n, P11k, 4-53, 4-55)

664-E.* (Italian.) **Pointers on Light Alloy Casting Design.** G. Barchiesi. *Fonderia,* v. 7, June 1958, p. 241-248

Metallurgical, mechanical and physical properties of light alloys. Solidification and use of chills; supply of metal to thick sections; shrinkage; castability of alloys: problems caused by inserts. (E-general, E25, 17-51; Al, Mg, *Cu, Si, Zn*)

665-E.* (Italian.) **Testing of Oily Sand Binders.** Rinaldo Cannaneo. *Fonderia,* v. 7, June 1958, p. 249-255.

Definition, role, procedures for determination of saponification number, surface tension, acidity and water content. Preparation of reactives. (To be continued.) (E18n)

666-E.* (Italian.) **Epoxy Resins in the Construction of Patterns and Core Boxes.** *Fonderia,* v. 7, June 1958, p. 265-268.

Mechanical properties of a typical epoxy resin. Construction of patterns and core boxes by lamination with fiberglass or by casting; machining of cast patterns; simple method of repairing damaged surfaces. Cleaning of equipment used in handling resins; safety precautions to protect respiratory and skin areas. (E17, E18n, E21; NM-d30)

667-E.* (Japanese.) **Pulverizing of Silica Foundry Sands on Shock-Heating.** Umeji Harada and Keizo Nishiyama. *Japan Foundrymen's Society, Journal,* v. 30, June 1958, p. 456-467.

Four typical silica sands were analyzed. Pulverizing of each silica sand shock-heated to 1500° C. was related to grain size. Pulverizing is closely connected with the geological origin of each sand. On the whole, foundry silica sands on shock heating are more pulverized than new sands. Differences in pulverizing on shock-heating become smaller as the grain size diminishes. 12 ref. (E18r)

668-E.* (Japanese.) **Relation Between Grain Size and Permeability in Molding Sand.** Jiro Kashima and Mototaka. *Japan Foundrymen's Society, Journal,* v. 30, June 1958, p. 468-471.

Permeability is determined by grain distribution, grain shape, the quality and quantity of the binder

and the packing rate. Consequently, if the quality and quantity of binder and packing rate are kept constant, the relation between grain size and permeability may be determined in the form of an equation. (E18r)

669-E.* (Japanese.) **Properties of Shell Cores Made by the Blowing Process. Pt. 2. Moldability.** Kaoru Kato. *Japan Foundrymen's Society, Journal,* v. 30, June 1958, p. 472-478.

Shell test specimens were made by a core blower into several kinds of shape. With slender shell cores, resin-coated sand or resin-sand should be blown in the direction of core axes. An injection hole of smaller diameter seems to be beneficial. When the sand is blown in the direction perpendicular to the axis or the surface of the shell core, a specified suitable diameter of injection hole should be selected. (E19c)

670-E. Alloying and Heat Treating Ductile Cast Iron. Massachusetts Institute of Technology. (Watertown Arsenal.) *U. S. Office of Technical Services,* PB 131350, Aug. 1955, 95 p. $2.50.

Basic variables in risering and their effects on shrinkage. Proper control can reduce gross shrinkage to a level at which large sprues and flow-offs are sufficient to act as risers and feed the casting. Sponge-type shrinkage is caused by lack of adequate graphite precipatating. A carbon-silicon relationship was established to eliminate sponge shrinkage. How and where the principles of machinability apply to ductile cast iron; various conditions of cutting ductile iron matrices; and machining forces measured and analyzed; relationships of cutting fluids to machining forces and surface finish. (E22g, P10c, T2, G17k; CI-r)

671-E. Investigation of Nodular Cast Iron Manufactured in the Springfield Armory Casting Laboratory. O. Lubinkowski. Springfield Armory. *U. S. Office of Technical Services,* PB 131399, May 1957, 45 p. $1.25.

Good machinability and toughness of nodular cast iron, its excellent resistance to corrosion and high temperatures, led to successful effort to prepare thin-wall castings less than ½ in. thick. Magnesium-silicon alloy containing copper was used as the inoculant.
(E25; CI-r, *Mg, Si, C,* AD-p36)

672-E. Light Alloy Casting. *Design Engineering,* Aug. 1958, p. 33, 35-51.

Sand casting, permanent mold and die casting of Al, Mg and Mg-Zr alloys analyzed and rontrasted.
(E11, E12, E13; Al, Mg, *Zr*)

673-E. Steel Castings for Heavy Machines. *Foundry Trade Journal,* v. 105, July 3, 1958, p. 15-16. (From *Vestnik Mashinostroeniia,* Dec. 1957, p. 28-32.)

Recent developments in mechanized molding and casting in USSR. (E19, 18-74; ST)

674-E. Chilled Iron Rolls. Production at Thomas Robinson & Son, Ltd. Trevor Kneale. *Iron and Steel,* v. 31, July 1958, p. 351-354.

(E22r, W23k; 5-66, CI)

675-E. Coreless, Hollow Die-Casting. *Metalworking Production,* v. 102, Aug. 1, 1958, p. 1345-1347.

New development in die-casting technique permits hollow casting without the use of cores. Wall thickness can be controlled, casting speed increased, metal saved and weight of product reduced.
(E13, 1-52)

676-E. (German.) **Testing Spherical Castings for Cavities.** Joseph Czikel. *Freiberger Forchungshefte,* v. B30-1, 1958, p. 209-226.

Influence of pouring time and casting temperature. 15 ref.
(E23, 2-61, 3-67; CI, 9-67)

677-E. (German.) **Manufacture and Properties of Resin Coated Sand.** G. Hevenesi and J. Szekeres. *Freiberger Forschungshefte,* v. B30-1, 1958, p. 227-238.

Procedures for preparation of shell-mold sand and testing with different resins and additions.
(E19c, E18n)

678-E. Use of Vacuum in Sand and Gravity-Die Casting to Minimize Waste. L. Pilz. *Giessereitechnik,* v. 2, no. 9, 1956, p. 202-206. (Henry Brutcher, Altadena, Calif., Translation no. 4297.

Application of vacuum to production of extremely light-section and dense castings of nonferrous metals. Portable vacuum installation.
(E11, E13, 1-73, 1-52)

679-E.* **Cast Die Cavities. Pt. 2.** Irwin Lubalin. *Precision Metal Molding,* v. 16, Aug. 1958, p. 30-31.

Shaw process cavities and cores which do not have substantial

amounts of the cast skin removed by machining and polishing result in die life 50 to 60% superior to dies machined by conventional die sinking methods from wrought stock. Also better heat dispersion is found when an entire intricate cavity can be cast in one piece, not in a series of inserts. (E13, W19n)

680-E.* Design Castings for High Stress Uses. *Precision Metal Molding,* v. 16, Aug. 1958, p. 21-22.

High-strength Al casting alloy, tradenamed Tens-50, has superior tensile and yield strengths which permit many forgings to be replaced with castings. Additions of small amounts of Be and Na neutralize the embrittling action of both Fe and Si normally found in casting alloys and improve the fluidity of the melt so that sound, thin walls can be cast.
(E12, E25p; Al, *Be, Na,* 5-63)

681-E.* (German.) Experiments on the Mechanical Qualities of 30-Mm. Diameter Gray-Iron Test Pieces Made With Permanent Molds. Joseph Czikel and Josef Sturm. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 7-45.

Permanent mold methods for obtaining machinable gray iron castings. Influence of cooling velocity on grain tensile strength and Brinell hardness is shown by means of test pieces cast with molds of different temperatures and wall thicknesses. Permanent mold castings have better mechanical properties than sand castings. 35 ref.
(E12, G17k, Q-general; CI, 5-63)

682-E.* (German.) New Foundry Methods: CO_2 Molding, Necking Cores, Calcium Carbide Addition to the Cupola. Gerd Scharf. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 68-83.

Waterglass CO_2 technique; preparation of "necking cores" for facilitation of fettling. In the cold blast cupola furnace, an addition of 0.5 to 1.0% CaC_2 was found most efficient. (E10a, E18n, E21)

683-E.* (German.) Studies on the Continuous Casting of Small Steel Parts in Shell Molds. Hans Woykoss. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 84-97.

Survey of parts for which the method is applicable. Suggestions for the manufacture of metal patterns. Casting in stack molds; vertical and horizontal casting. Manufacture of shell molds, sizes and arrangement of gates, feeders and risers. Machining allowances and shrinkage tolerances.
(E16c, 1-61; ST)

684-E.* (German.) Induction Melting of Cast Iron and Its Significance for the East German Foundry Industries. Gerhard Gertz. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 98-109.

From the viewpoint of East German industry neither the hot blast furnace making high investment necessary nor the cold blast furnace requiring first-class coke have been economically satisfactory. Any country that is forced to import quality coal can use an electric furnace more economically. The most suitable induction furnaces are of a frequency from 2000 to 500 Hz (for charges of about 10 tons). An induction furnace gives cast iron of greater strength. 12 ref.
(E10r, W18a; CI)

685-E.* (German.) Thermal Reclamation of Used Sands. Joseph Czikel and Klaus Quappe. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 110-134.

Different reclamation processes (e.g., air flow, washing with water, and burning the organic components); experiments with the burning procedure. Organic bound sands are reclaimable provided the temperatures are high enough and the quantity of oxygen is sufficient. 10 ref. (E18s, 2-61)

686-E.* (German.) Automotive Parts of Nodular Cast Iron Made in the Cold Blast Cupola Furnace and Treated With Liquid Magnesium. Walter Feicke and Karl Lange. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 181-208.

These parts can compete with those made of malleable cast iron due to their steel-like physical properties and require even less wall thickness. In the Mg treatment a vessel with molten Mg is put on the surface of the molten iron. When the Mg ignites. the vessel is lowered to the pan bottom. Procedure for large and for small quantities. 5 ref. (E25q; CI-r, *Mg*)

687-E.* (German.) Mass Production of Large Diesel Engine Crankcases of Light Metal. Martin Solti. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 239-261.

Old processes; new procedures carried on with new equipment. Details of molding, coremaking, design of pouring basins, runners, gates, skimmer gates and air drains. Melting and casting processes; cleaning and heat treatment of the cast crankcase. 4 ref. (E11, W11j; Al)

688-E.* (German.) **Methods for Increasing the Accuracy of Castings.** Fritz Naumann. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 262-286.

Procedures with sand molds and with permanent molds and dies for the production of parts that require a minimum of machining, or no machining at all. Precision patterns, shell molds, a new kind of pattern. Practical examples.
(E-general, 17-54)

689-E. **Investment Casting of Nonferrous Metals.** E. Weisner. *Foundry Trade Journal,* v. 105, Aug. 7, 1958, p. 163-166.

(E15; EG-a38)

690-E. **Alumina Coated Silica-Sand Molds for Heavy Sectioned Steel Castings.** Béla Körös. *Kohaszati Lapok-Ontöde,* v. 91, Apr. 1958, p. 95-97.

(E19, E18p; ST)

691-E. (Hungarian.) **Producing Colloidal Graphite. Its Use in the Foundry.** Gyorgy Pavai. *Kohaszati Lapok-Ontöde,* v. 91, Apr. 1958, p. 85-90.

Results in coating molds for aluminum, iron, bronze and copper castings.
(E19; Cu, Cu-s, Fe, NM-k36)

692-E. **Formation of Blowholes in Surface of Castings of Magnesium-Treated Cast Iron.** A. D. Ushakov. *Liteinoe Proizvodstvo,* Mar. 1957, p. 19-20. (Henry Brutcher, Altadena, Calif., Translation no. 4291.)

Previously abstracted from original. See item 257-E, 1957.
(E25s; CI, *Mg,* AD-p, 9-68)

693-E. (Russian.) **Application of Malleable Cast Iron for Agricultural Machinery.** M. M. Turbovskii. *Liteinoe Proizvodstvo,* June 1958, p. 2-4.

Melting iron in cupola furnace with oxygen blast in forehearth, sharply reduces cost of metal as compared to use of Duplex process. 9 ref. (E10a, T3, 17-57; CI-s)

694-E. (Russian.) **Mold Pressing Under High Pressure.** I. R. Dudnik. *Liteinoe Proizvodstvo,* June 1958, p. 4-9.

Molding in earthen forms under high pressure results in products of high precision and clean surfaces. Fully mechanized molding assembly. (E19)

695-E. (Russian.) **Mechanization of Assembly, Filling and Knocking-Out of Shell Molds.** A. M. Neimark. *Liteinoe Proizvodstvo,* June 1958, p. 9-11.

(E16c; W19g)

696-E. (Russian.) **Formation of Spheroidal Graphite and Progress in Nodular Iron Technology.** B. S. Mil'man. *Liteinoe Proizvodstvo,* June 1958, p. 11-17.

Method developed for producing spheroidal graphite by use of inert gas in liquid iron of low sulphur content. White iron with high Mg content was used. 22 ref.
(E25q; CI-r, *Mg,* EG-m)

697-E. (Russian.) **Control of Gas Saturation in Casting Copper Alloys.** A. M. Kartseva and T. A. Vikhoreva. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 410-413.

Method is based on determination of pressure at moment of separation of first bubble of dissolved gases from melt.
(E25s; X12n, Cu-b)

698-E. (Swedish.) **Oxygen in Cast Iron.** Gustav Ostberg. *Gjuteriet,* v. 48, June-July 1958, p. 97-104.

Quantity of oxygen that can be found dissolved in cast iron calculated for the system FeO-C-Si. Results of oxygen determinations in malleable iron; different methods for sampling and analysis.
(E25s, S11r; CI, *O*)

699-E.* **The Controlled-Slag Hot-Blast Cupola.** D. Fleming. *British Foundryman,* v. 51, June 1958, p. 291-302.

Recuperative system for blast heating. Early results and problems, particularly those relating to necessity for controlling high melting temperature in fully cooled slag-line cupolas. Importance of air velocity at tuyeres. Evolution of conical shell design; theoretical explanation of behavior encountered with fully cooled melting zones; size limitations on furnace. Relationships between slag basicity, Si content and metal temperatures; control of carbon pick-up and sulphur removal; heat balance of plant; continuous operation. 18 ref.
(E10a, W18d, 17-51; CI-n)

700-E.* **A Simple Guide to the Use of Exothermic Feeding Compounds in**

the Foundry. G. N. Cherry. *British Foundryman,* v. 51, June 1958, p. 303-307.

Correct use and advantages of exothermic feeders. Relationship between shape and dimensions of riser and casting defects.
(E22q, E22s; 5-60, 9-67, 9-68)

701-E. (Russian.) **Nitrogen in Cast Iron.** L. I. Levi. *Liteinoe Proizvodstvo,* no. 6, 1955, p. 22-25.

Treatment of molten cast iron with nitrogenous compounds (ammonia, cyanamides, ferrocyanamides) which dissociate and release chemically active atomic nitrogen, strengthening the iron. With increased nitrogen content, ferrite disappears, pearlite is stabilized and condensed and graphitic inclusions are disintegrated and dissipated. Greatest increase in strength is observed in common gray iron.
(E25q; CI, *N*)

702-E. An Introduction to Pattern-making in Plastics. H. G. C. King. *British Foundryman,* v. 51, June 1958, p. 282-290.

Use of epoxy resins for foundry patterns in British railways shop. Methods and equipment, production of master pattern and molds, small solid patterns and large laminated patterns. (E17; NM-d30)

703-E. Refractories in the Foundry. J. H. Cannon and A. L. Bradley. *Refractories Journal,* v. 34, July 1958, p. 309-317.

Refractory failure caused by physical erosion, chemical composition and slag attack, characteristics of Al and MgO, brick, monolithic linings. 8 ref.
(E-general; RM-h)

704-E. (German.) **Centrifugal or Die Casting?** *Giesserei Praxis,* v. 14, July 25, 1958, p. 281-282.

Centrifugal casting assures improved mechanical and structural properties. Horizontal and vertical casting at 10 to 3,000 rpm. Influence of case and cross section on quality. (E14, E13)

705-E.* Surface Sinking Defects in Light Sectioned Grey Iron Castings. A. G. Fuller and I. C. H. Hughes. *Castings,* v. 4, June 1958, p. 33-48.

Some factors in reducing incidence of sinking defects are: eutectic composition, high manganese, low sulphur content, no inoculation, high melting temperature, low melting rate, or holding, pouring temperature of 1280° C., proper gating ratio, limiting amount of flow into molds, rapid filling, uniformity of pattern manufacture, use of rigid molds, casting with bosses uppermost. Factors minimizing one defect may increase incidence of another so changes in foundry practice should be controlled. 9 ref.
(E11; CI, 9-71)

706-E. Influence of the Vacuum and Temperature of Superheating on the Structure of Pig-Iron. I. E. Brainin and S. I. Shapovalov. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 91-98. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 558-E, 1957.
(E25q, E10, 1-73; CI)

707-E. Magnesium Treatment of Low-Sulphur Basic-Cupola Iron. G. I. Kletskin. *Liteinoe Proizvodstvo,* v. 9, no. 9, 1957, p. 21-26. (Henry Brutcher, Altadena, Calif., Translation no. 4303.)

Previously abstracted from original. See item 98-E, 1958.
(E10a; CI-a, Mg, AD-a)

708-E. (German.) **Patternmaking.** Heinz Lucas. *Giessereitechnik,* v. 4, June 1958 p. 128-132.

Co-ordination of pattern design and patternmaking with other foundry activities. (E17)

709-E. (German.) **Nonferrous Cast Metal—a Versatile Material.** Gunther Andexer. *Industrie Anzeiger,* v. 80, May 2, 1958, p. 521-523.

The basic metals are: Cu, Zn, Al, Mg. Properties of different alloys and the most adequate casting process. Economic considerations.
(E-general; EG-a38)

710-E. (Book.) **Foundry Manual (Navships 250-0334).** John Varga, Jr., and N. H. Keyser. 291 p. 1958. Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio. $3. (Available from U. S. Government Printing Office, Washington 25, D. C.)

(E-general)

711-E.* (French.) **Elimination of Microporosity in Defective Castings.** Louis Gascuel. *Pratique des Industries Mecaniques,* v. 44, June 1958, p. 164-165.

Procedure and equipment used in injection into holes of suitable substance, usually a synthetic resin,

followed by heat treatment designed to provide adherence, mechanical strength and corrosion resistance to injected material. (E25q, 9-68)

712-E.* (German.) **Use of Chills in Casting.** J. Tanner. *Giesserei Praxis,* v. 12, June 25, 1958, p. 239-242.

Chill iron casting process is particularly adaptable to nonuniform thicknesses, high stress values, fine grain structures and hardness of Brinell 180-220 for component parts of machine tools. Chills are not preheated and are used repeatedly. They are treated with mixture of fuel alcohol, colophane and graphite powder before utilization to insure longevity. Examples include castings of 4 to 6 tons with wall thicknesses up to 80 mm. (E22r; CI)

713-E.* (German.) **Cooling System for Dried Quartz Sand.** Karl Haake. *Giessereitechnik,* v. 4, June 1958, p. 123-124.

Sand is oven-dried and a conveyor transports it to a cooling tower in which water is circulated. Inside is a zigzag pipe through which the sand slides. Temperature depends on outside air and cooling water temperatures. Temperature measurements at different times were: entering sand temperature 40 to 60° C.; final sand temperature 18 to 25° C. Capacity of the cooler is 900 liters per hr. The cooling tower uses 1800 liters per hr. of water at 15° C. (E18b)

714-E.* (German.) **Basic Technology of the Elimination of Micro-Porosity by Impregnation With the Thermosetting Epilox-Adhesive M 26.** H. Grosch and B. Hildebrand. *Fertigungstechnik,* v. 8, June 1958, p. 266-267.

Preparation and properties of the adhesive. Cleaning and degreasing of parts to be impregnated (e.g., pressure resistant castings). Impregnating by simple infiltration, by pressure or vacuum, by a combination of pressure and vacuum, and by application of ultrasonics. Health protection. (E25q; NM-d30)

715-E.* (German.) **Sand Mold Casting of Magnesium Alloys.** Hans Haensch. *Giesserei Praxis,* v. 12, June 25, 1958, p. 235-239.

Mechanical properties of cast pieces depend on mold, filling capacity, mold construction, and type of sand and slab used. Adequate proportions of water, sulphur, flowers of sulphur, boric acid, and absence of burnables in Kaiserslautern sand assure desired quality in green-mold casting. Crush, color and X-ray tests conducted on ordinary and heat-treatable Mg alloys shed light on behavior of surface finish, grain formation, stress and piping of castings. Steel molds of special design produce required strength in cast structures. (E11; Mg-b)

716-E.* Some Experiments on Methods of Production of Nodular Cast Iron. S. N. Anant Narayan and S. Visvanathan. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 136-141.

Effects of chloride additions, especially calcium and barium chlorides, to molten cast iron. Results are negative in that the graphite structure is not altered from the normal flaky type to the spherulitic variety. Various methods of adding the agents, experiments to try the feasibility of reducing the chlorides by Al and changes in the composition of the base iron met with no success. Concluded that the production of nodular cast iron by calcium chloride treatment is open to severe criticism. 17 ref. (E25q; CI-r)

717-E.* Why and Where to Use Centrifugal Castings. Pt. 2. Nonferrous Castings. John L. Everhart. *Materials in Design Engineering,* v. 48, Sept. 1958, p. 93-95.

Properties of some alloys used for centrifugal castings; properties of static and centrifugally cast Cu alloys compared; centrifugal castings of Ni, Monel, S-monel, H-monel, G-nickel, Si-Ni, Inconel and silicon Inconel. 4 ref. (E14, Q-general; Cu-b, Ni-b)

718-E.* Effect of Temperature and Atmosphere on Iron-Silica Interface Reaction. G. A. Colligan, L. H. Van Vlack and R. A. Flinn. *Modern Castings,* v. 34, Sept. 1958, p. 54-60.

Variables affecting the reaction are the compositions of metal and sand, pouring temperature and casting cooling rate, metal pressure and the mold atmosphere. Mechanism of mold attack analyzed. Severity dependent upon temperature, time and oxidation. 11 ref. (E11; 9-71, 2-61)

719-E.* Reduction of Silica in Large Shell Molds. L. H. Van Vlack, R. G. Wells and W. B. Pierce. *Modern Castings,* v. 34, Sept. 1958, p. 61-67.

Surface finish, porosity (as influenced by pouring temperature), section size, carbon content, alloy additions, mold composition. 44 ref. (E16c)

720-E. Sodium Silicates for the CO_2 Process. E. A. Lange and R. E. Morey. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131642, Apr. 1958, 19 p. $.50.

Sands mixed with sodium silicate solutions can be hardened by exposure to carbon dioxide in a matter of seconds. This is an important advantage over conventional methods requiring hours of baking time. Parameters which may be applied directly to the practical application of the CO_2 process. Strength characteristics of the sand mixture related to composition of the sodium silicate solution. Evaluation of such factors as mixing order, CO_2, flow rate and drying techniques. (E18p)

721-E.* (German.) **Formation of Pores and Blisters in Zinc Die Castings.** K. Ruttewit. *Metall,* v. 12, Aug. 1958, p. 713-721.

Prerequisite for a minimum of these defects is a properly pure Zr alloy. Remelting of rejected parts is therefore not advisable. Overheating of melt produces gas porosity. Use of tray risers to eliminate froth. Elimination of old nonmetallic crucibles to avoid penetration of fuel combustion gases through bottom. 46 ref. (E13; Zn, 9-68)

722-E.* (Swedish.) **Surface Roughness of Iron Castings From Sand Molds.** Olof Carlsson. *Gjuteriet,* v. 48, Aug. 1958, p. 111-115.

Surface tension of liquid iron, its contact angles with sand particles, size of pores in mold wall and the size of sand influence surface roughness. Percentages of powdered coal and dextrin not critical. Coal dust important, to avoid iron oxide that would cause contact angles near 0° and penetration of iron into sand rough surfaces. (E11, E18r; CI)

723-E. Casting Defects. J. R. Park. *Foundry Trade Journal,* v. 105, Aug. 28, 1958, p. 257-260.

Various defects, functions of metal and melting; sand and molding material; molding practice; patterns; design. (E11; 9-68, 9-69)

724-E. Design of Die-Castings. Pt. 8. Designing Die-Castings for Easy Finishing. H. K. Barton. *Metal Industry,* v. 93, Aug. 15, 1958, p. 136-138. (Conclusion.)
(E13, L-general; 5-61, 17-51)

725-E. Some Aspects of Modern Aluminum Casting. L. Fletcher. *Metal Industry,* v. 93, Aug. 15, 1958, p. 129-132; Aug. 22, 1958, p. 149-151.
(E13; Al)

726-E. What Is Preventive Maintenance? J. M. Abernath. *Modern Castings,* v. 34, Sept. 1958, p. 20-21.

Preventive maintenance defined and described from several standpoints. (E-general, W19, 18-71)

727-E. Centrifugal Pumps Prime Preventive Maintenance. Robert E. Jacoby. *Modern Castings,* v. 34, Sept. 1958, p. 24-25.

Pumps are key to auto foundry's sand reclamation system designed for minimum maintenance expense. (E18s)

728-E. Saving Through Preventive Maintenance. Chicago Hardware Foundry Co. S. A. Simonson. *Modern Castings,* v. 34, Sept. 1958, p. 26-28.
(E-general, W19; 18-71)

729-E. Saving Through Preventive Maintenance. Electric Steel Foundry Co. Les Wittmayer. *Modern Castings,* v. 34, Sept. 1958. p. 29.
(E-general, W19; 18-71)

730-E. Saving Through Preventive Maintenance. Stanton Iron Works Co., Ltd. J. I. Blackbourn. *Modern Castings,* v. 34, Sept. 1958, p. 30-34.
(E-general, W19, 18-71)

731-E. Die and Permanent Mold Casting of Non-Ferrous Metals in the United Kingdom. L. J. Brice and G. A. Broughton. *Modern Castings,* v. 34, Sept. 1958, p. 68-81.
(E12, E13; EG-a38)

732-E. Study of High Temperature Properties of Shell Molds. R. A. Rabe. *Modern Castings,* v. 34, Sept. 1958, p. 86-96.

Results of tests using bank sand, round and angular grain silica sand and 4-6% resin. Optimum composition and procedures. (E16c; 2-63)

733-E. Construction of Shell Mold Patterns and Core Boxes. Wayne A. Wright. *Modern Castings,* v. 34, Sept. 1958, p. 97-98.
(E16c)

734-E.* (German.) **Improvements in the Mechanical Properties and Machinability of Cast Iron by Magnesium Treatment and Annealing.** Bruno Beyer and Hellmuth Seliger. *Giessereitechnik,* v. 4, July 1958, p. 153-158.

Three cast irons of almost the same percentage of C (2.98 to 3.35%) and Si (1.59 to 1.81%) but different P content (0.21 to 0.66%) are treated with Mg-Si-Fe alloy to add 0.2 to 0.3% Mg of heat weight. On annealing, the cementite decomposed in proportion to annealing time. Tensile strength and notch impact strength improved. Best machinability obtained with ferritic structure and no cementite. 17 ref. (E25, Q-general, G17k, 2-60, 2-64; CI)

735-E.* (German.) **Cupola Practice in the USSR.** L. M. Marienbach. *Giessereitechnik,* v. 4, July 1958, p. 159-161.

The problem of how to adapt cupola practice to high tapping temerature and continuous service. Current solutions such as increasing the radiation heat by high valve fuels (e.g., coke briquets) preheating the air blast and use of oxygen. 26 ref. (E10a)

736-E. (German.) **Economy by Exactly Dimensioned Precision Castings.** W. Schumacher. *Industrie Anzeiger,* v. 80, May 2, 1958, p. 519-520.

With precision cast small parts, finishing operations can be reduced to a minimum if the molds are formed very accurately. (E15, 17-53)

737-E. (German.) **Zinc Die Casting Is Advancing.** K. Baver. *Metall,* v. 12, Aug. 1958, p. 758-759.

Progress in Europe and U. S. Applications in the manufacture of nameplates, tail-light frames, small motor casings, electrical meters, etc. (E13, T-general, 17-57; Zn)

738-E.* **Melting Practice for Aluminum Casting Alloys.** William N. Brammer. *Modern Castings,* v. 34, Oct. 1958, p. 31-36.

Guide to casting techniques. 10 ref. (E-general; Al-b)

739-E.* **Cast Die Cavities. Pt. 3.** Irwin Lubalin. *Precision Metal Molding,* v. 16, Sept. 1958, p. 56.

Disadvantages of the Shaw process weighed against future prospects and growth. Offers rapid economical way of producing die-casting dies and replacement cavities as well as trim dies and machining fixtures and offers possibility of vastly improved die life. (E13, W19n)

740-E. **Investigation of Nodular Cast Iron Manufactured in the Springfield Armory Casting Laboratory.** Olgierd Lubinkowski. U. S. Armory, Springfield, Mass. *U. S. Office of Technical Services,* PB 131399, May 1957, 45 p. $1.25.

Use of Mg-Si as inoculant in preparation of thin-wall, hypereutectic iron. Other addition agents, such as ferromanganese, tellurium, Lanceramp, and ferrosilicon evaluated for producing an iron with fully pearlitic structure and restricted carbide.
(E25q; CI-r, AD-p36)

741-E. **Alloying and Heat Treatment of Ductile Cast Iron. Massachusetts Institute of Technology.** *U. S. Office of Technical Services,* PB 131350, Aug. 1955, 97 p. $2.50.

Basic variables involved in risering ductile iron castings; effect on shrinkage. The amount of gross feed metal required depended upon carbon content, Si content, pouring temperature and rigidity of mold. Large sprues and flow-offs are sufficient to act as risers and feed the casting. Sponge shrinkage was eliminated by observing the following relationship. The % carbon + 1/7% silicon = 3.9%. Cutting of ductile iron; machining forces measured and analyzed.
(E22q, G17, J-general; CI-r)

742-E.* (German.) **Improved Cast Surfaces and Higher Production by the Use of Core Materials With Increased Flow Properties.** Ernst Wunderlich. *Giessereitechnik,* v. 4, July 1958, p. 169-172.

Good surfaces were obtained with cores made with oil binders and sands of grain sizes < 0.06 to < 0.3. This material suited for balanced cores up to 12 cm. in height, for cores made in jolting machines and for cores up to 15 cm. diameter. (E21g)

743-E.* (German.) **Processes for the Improvement of Various Properties of Cast Aluminum-Magnesium Alloys.** Hermann Kessler. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 312-316.

A new grain refining process for cast Al-Mg alloys was developed, introducing carbon chloride vapor into alloys containing Ti, B and Be by means of a carrier gas such as nitrogen. Through a reaction with carbon, titanium carbide and titanium diboride are formed which effect a particularly refined structure through the formation of nuclei.

Chlorine gas in nascent state contributes to purification and degassing of melt. Yield strength, elongation, hardness, Charpy impact strength and fatigue strength are improved. (E25q, E25s; Al, Mg)

744-E.* (Russian.) **Vacuum Pressure Die Casting.** M. L. Zaslavskii. *Liteinoe Proizvodstvo,* July 1958, p. 6-8.

Application of vacuum pressure to eliminate porosity in castings has shown many other advantages. It provides stronger, cleaner surfaces and reduces waste by 15%. It has largely eliminated cracks in casting Mg alloys and increased strength of Zn alloy castings by 19%. (E13, 1-73; Mg, Zn)

745-E.* (Russian.) **Nonferrous Metal casting in Plaster Molds.** V. G. Baradan'yants. *Liteinoe Proizvodstvo,* July 1958, p. 9-11.

Advantages of casting in plaster molds as against precision investment casting are that it can handle much larger thin-walled objects as well as parts with narrow cavities. It is necessary to use high-strength alpha-plaster which hardens slowly. Its preparation requires a 6 to 8-hr. treatment of calcium sulphuric acid in vapor at 1.2 to 1.3 atm. pressure followed by drying for 8 to 10 hr. at 120 to 124°. (E16a)

746-E.* (Russian.) **Hot Cracking Resistance of Cast Steel and Method of Increasing It.** N. S. Kreshchanovskii and M. P. Demin. *Liteinoe Proizvodstvo,* July 1958, p. 17-21.

Hot cracks form primarily at the crystal boundaries. The main factor determining the crack-resistance of steel is the character of the intercrystalline bonds which are determined by the substances entering into steel composition. Of particular importance is the surface activity of these elements. Admixtures which are introduced during the crystallization process, having the effect of reducing surface activity and increasing surface tension, will contribute to reducing hot cracks. Introduction of 3% Ti has proven to be most effective means of reducing surface activity and cracks. 30 ref. (E25q, 19-72; ST, Ti, AD-p)

747-E.* (German.) **Gray Cast Iron and Steel Scrap.** J. Tanner. *Giesserei Praxis,* no. 15, Aug. 10, 1958, p. 291-293.

Steel scrap additions (up to 25%) improve quality and appearance of gray cast iron. Careful preparation (calculation of composition, analysis and mechanical tests) performed on steel scrap used. (E11; ST, CI-n, RM-p)

748-E. Gas-Turbine Castings. P. V. Brown. *Aircraft Production,* v. 20, Sept. 1958, p. 337-342.

Recent developments in foundry techniques; use of epoxy resins in making pattern equipment. (E17, W11n)

749-E. Improvement of Cast Iron by Oxygen Blowing. Ichiro Iitaka and Kokichi Nakamura. *Foundry Trade Journal,* v. 105, Sept. 11, 1958, p. 313-314.

Results of tests using oxygen injection as a substitute for steel scrap to lower Si and C content when making cast iron from remelted pig iron. (E25; CI)

750-E. Recent Developments in the Manufacture of Castings. J. L. Rice, R. W. Ruddle and P. A. Russell. *Institution of Mechanical Engineers, Proceedings,* v. 171, 1957, p. 133-160. (E-general)

751-E. Casting or Forging? *Light Metals,* v. 21, Sept. 1958, p. 276-278.

Comparison of properties, costs, methods of casting and forging light metals. (E-general, F22; Al, Mg, Ti)

752-E. Frozen Mercury Investment Casting. *Mass Production,* v. 34, Sept. 1958, p. 92-98.

Mercast process has been introduced to England by Sankey-Telcon Ltd. (E15)

753-E. The Mercast Process. *Metal Industry,* v. 93, Aug. 1, 1958, p. 93-96.

Precision investment casting by the Mercast process, which uses frozen mercury as the pattern material. (E15)

754-E. We Cast the Impossible. R. H. Osbrink. *Modern Castings,* v. 34, Oct. 1958, p. 22-25.

High-precision light metal castings made by use of extreme care, high-quality cores and molds in Osbrink process. (E-general; Al, Mg)

755-E. Controlling C, H_2, O, N in Steel Melting. F. E. Van Voris. *Modern Castings,* v. 34, Oct. 1958, p. 28-30, 120-123.

Effect of various deoxidants, addition agents, and removal of common gases from molten steel. 16 ref. (E25s; ST, *O, N, H*)

756-E. Duplexing Pays at Automotive Foundry. H. A. Laforet and F. J. Webbere. *Modern Castings,* v. 34, Oct. 1958, p. 37-40.

Under favorable circumstances the duplexing of cylinder iron can show a net cost advantage if used to its full potential. Duplexing allowed major improvement in cupola practice and metal transfer operations. (E10a, T21b; CI)

757-E. Aluminum Melting Practice in the Die Casting and Permanent Mold Fields. J. P. Moehling. *Modern Castings,* v. 34, Oct. 1958, p. 67-77.

General properties of Al, fluxing, porosity, melting furnaces. (E13, E12; Al)

758-E. Sand Castings Are Expensive. *Precision Metal Molding,* v. 16, Sept. 1958, p. 55, 60.

Switching from a sand cast hinge to a permanent mold cast hinge resulted in a decrease in machining costs and weight, and reduced inspection costs, handling and rejects. (E11, E12)

759-E. (Russian.) **New Foundries in Heavy Machinery Plants.** P. N. Bidulya. *Liteinoe Proizvodstvo,* July 1958, p. 1-2.

Installation of new mechanized foundry equipment has made it possible to turn out much larger castings while sharply reducing the cycle of production. Greater precision in casting parts has resulted in large savings of machining time. 6 ref. (E-general, W19, 18-74)

760-E. (Russian.) **Runner System Dimensions in Pressure Die Casting.** A. K. Belopukhov. *Liteinoe Proizvodstvo,* July 1958, p. 3-6.

6 ref. (E13, E22)

761-E. (Russian.) **Structure Formation at High Cooling Rate of Melt.** I. V. Salli. *Liteinoe Proizvodstvo,* July 1958, p. 22-25.

Decisive effect of speed of cooling on metal structure. Method of increasing cooling rate during crystallization of alloys. 8 ref. (E25q, 2-61, 3-67)

762-E. (Book.) **Introduction to Foundry Technology.** D. C. Ekey and W. P. Winter. 296 p. 1958. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. $7.

Foundry theory and practice for the engineering student. (E-general)

763-E.* Casting Iron Patterns in Zircon Sand. C. W. Yaw. *Foundry,* v. 86, Oct. 1958, p. 74-75.

Reduced machining not only cuts costs but leaves the pattern with a good wearing surface. (E17; CI, NM-f45)

764-E.* Shrinkage Prevention in Bronze Castings. Clyde L. Frear. *Foundry,* v. 86, Oct. 1958, p. 84-89.

Correct use of risers, pencil gates, runners, chills and padding to insure sound castings. Optimum pouring technique. (To be continued.) (E22; Cu-s)

765-E.* (French.) **New Hot Blast Cupola With Direct Recovery of Heat From Charging Hole Gases.** Georges Ulmer. *Fonderie,* June 1958, p. 263-272.

Inexpensive recuperator is mounted directly over charging hole, also acts as stack, combustion chamber and heat exchanger. Design and operation based on fact that charging hole gases contain, under average conditions, about 50% of heat produced by coke consumed, and that, to heat air required for combustion of coke to 400° C., for example, it suffices to recover only a third of sensible and latent heat from these gases. Use of this device reduced coke consumption, increased output of cupola formerly operated on cold blast. Good metallurgical results are obtained, as well as flexibility of operation. 8 ref. (E10a, W18d)

766-E.* (French.) **Contribution to the Study of Sprue Requirements in the Steel Foundry. Testing of a Simplified Method of Sprue Design Applied to Case of Three Rims.** Marcel Jaumain. *Fonderie,* June 1958, p. 273-278.

Sprues for rims of different dimensions were calculated by method described by Bishop, Myskowski and Pellini in *Transactions* of American Foundrymen's Society. Finished castings were sound except for a few minute flaws attributed to sand inclusions. These applications, plus others previously made, confirm validity of method. (E22; ST)

767-E.* (French.) **Special Stoving Processes. Use of Infrared Radiation for Mold Drying and Core Baking.** *Fonderie,* June 1958, p. 283-287.

Surface and internal temperatures of molds being dried by gas or electrically produced infrared radiation; depth and degree of drying as function of power of emission and duration of exposure. Gas-heated

ovens gave best results. Cores over 50 mm. thick were not successfully baked by infrared radiation alone, but good results were obtained by combination of radiation and convection. Gas is favored over electricity for both jobs because of high emissive power, more uniform radiation and relatively low cost. (Concluded.) (E19, E21h; RM-m)

768-E.* (German.) **Nonferrous Melting Practice.** W. Schröder. *Giesserei-Praxis,* no. 16, Aug. 25, 1958, p. 311-315.

Six important alloys, their characteristics, individual melting procedures in types of furnaces. Operation of furnaces, introduction of raw materials and skimming of slags. Alloys discussed are tin bronze, red brass, brass, aluminum bronze, lead bronze, and lead-tin bronze. (E10; Cu-b)

769-E.* (Italian.) **Materials and Techniques Used in the Preparation of Molds and Cores in the Brass Foundry.** L. Alladia. *Fonderia Italiana,* July 1958, p. 256-258, 264.

Sand, clay, metal, plaster and wax as mold materials; casting techniques in which molds made of these materials can be used; binders and additives. Selection of sand and binders for cores; coremaking by shell molding and CO_2 processes; baking. (E18, E19, E21; Cu-n)

770-E.* (Russian.) **Centrifugal Casting of Iron Water Pipe in Sand Molds.** Z. A. Grinberg. *Metallurg,* v. 3, Aug. 1958, p. 31-33.

Process is based on principle that the metal, solidifying in the mold, thickens considerably as result of the centrifugal force. Wall thickness of pipe produced by this method is 20% less, while length of pipe is 1.5 times greater than by usual methods, resulting in considerable saving of metal. (E15; CI, 4-60)

771-E.* (Spanish.) **Oxygenation of Gray Cast Iron.** Arturo Arasti. *Instituto del Hierro y del Acero,* v. 11, Apr-June 1958, p. 91-96.

Laboratory experiments demonstrated possibilities of controlling Si content of gray iron castings by injection of oxygen in ladle, without disturbing percentages of other elements in molten metal. Pressure and duration of injection have important effect on ultimate Si content. Pouring with a siphon ladle is recommended to separate highly fluid slag resulting from oxygen treatment. Specially designed injection device. 8 ref. (E23, E25, W18g; CI-n)

772-E.* (German.) **Factors in Synthetic Molding-Sand Preparation.** A. Hohmann. *Giesserei-Praxis,* v. 18, Sept. 25, 1958, p. 365-366.

Properties of molding sand can be changed by preparation. Influencing factors are water content, amount of clay, viscosity of the clay, smoothness of the clay layer surrounding the sand grain, relationship between preparation time and firmness, volumetric weight, compressibility. (E18)

773-E.* (Rumanian.) **Study of Factors Determining Grain Size in Magnesium Alloys.** Georgeta Dan and Aurelia Protopopescu. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 21-36.

Fine grain gives superior properties and better heat treatment. Tests showed the influence on grain size of chemical composition, progress of melting and introduction of substances capable of separating out carbon. Mn and Zn have almost no influence while aluminum has a distinct grain-refining effect. Super heating from 750 to 1050° produces a finer grain, the higher the temperature. Longer stays at lower temperatures partly compensate the effect of higher temperatures. Similar result also obtained by inoculation with methane or butane gas at lower temperatures (750-800° C.). This is a simple and economical method to obtain fine grain. 11 ref. (E25q; Mg)

774-E.* **The Ejection of Deeply-Cored Die Castings.** H. K. and L. C. Barton. *Machinery (London),* v. 93, Sept. 24, 1958, p. 723-733.

Problems associated with ejecting castings produced from deep cavities. Line drawings of typical push-rod and hydraulic cylinder ejection mechanisms, also of cores arranged for withdrawal by a finger cam and variations in wall thickness which can result from slight displacement of the core. By use of a retractable core arranged to slide in the direction of die travel, improved accuracy can be obtained. Dies arranged to be displaced transversely prior to the ejection of the castings and difficulties associated with die castings which incorporate long steel inserts. (E13)

775-E.* (German.) **Structure and Properties of Aluminum Castings With Inclusions.** A. G. Spasskij. *Freiberger Forschungshefte,* v. B24-3, July 1958, p. 7-18.

Inclusions may form if the Si in SiO_2 is replaced by Al. This reaction is favored by the use of a borax, cryolite or fluoride flux, while it is hindered by chlorides, especially barium chloride. It is eliminated by applying a chalk layer to the clay lining or by using magnesite or chromium magnesite linings. Changes in structure explained by invisible, equally distributed foreign materials. (E25q; Al, 9-69)

776-E.* (German.) **Shrinkage of Magnesium-Treated Cast Iron.** K. I. Wastschenko, R. P. Todorow and and W. W. Shishtschenko. *Freiberger Forschungshefte,* v. B24-3, July 1958, p. 47-83.

Cast iron with 3.23% C, 3.04% Si, 0.60% Mn, 0.084% P, 0.008% S, 0.045% Mg held at 1350° C. showed an increase of shrinkage properties by a gradual loss of Mg. Influence of Si and P and of cooling rate. Cavities favored by Mg, C, hindered by Si. 15 ref. (E25n, 2-60; CI, *Mg*)

777-E.* (German.) **Investigations on Cupola Furnaces.** Wilhelm Patterson. *Giesserei,* v. 45, Sept. 11, 1958, p. 525-531.

Furnace loss by application of hot blast air thought to be avoidable by choosing a coke of increased density and right size (probably 80-100 mm.), incrusting it with cement and adding calcium carbide. Producing high temperatures by heating the blast air with additional fuel rather than by increasing the coke charge is suggested. (E10a)

778-E.* (German.) **Use of Calcium Carbide in the Cupola Furnace.** Rudolf Schulze. *Giesserei,* v. 45, Sept. 11, 1958, p. 542-545.

Addition of 2-3% calcium carbide to raise the temperature in the zone above the tuyeres by more active coke combustion. The amount of calcium carbide added depends on the kind of iron or steel melted. Advantages are one-quarter less coke consumption, reduced amount of S in the iron, improved furnace efficiency, hotter iron and hotter slag, increased Si and C, faster starting of furnace. (E10a, E25r; CI)

779-E.* (German.) **Service Behavior of Clay-Bound Green Molding Sands.** Wilhelm Patterson and Dietmar Boenisch. *Giesserei,* v. 45, Sept. 11, 1958, p. 565-567.

In green sand molds, a moisture zone of lower strength forms under the sand surface. The strength of this moisture zone is measured by a new method. As a result sand expansion defects in castings can be prevented. (E18r, E19a)

780-E.* (German.) **Water Glass as Binder in Molding and Core Sands.** F. W. Nield and D. Epstein. *Giesserei,* v. 45, Sept. 11, 1958, p. 567-575.

Experiments with quartz sand "Redhill F" and water glass in a weight proportion of SiO_2 to Na_2O from 2.0 to 3.3. In CO_2 treatment water glass with proportion of 2.0 gave highest compressive strength of mold. The smaller the proportion of SiO_2 to Na_2O, the longer the time required for CO_2 treatment; however, strength was improved. (E18n)

781-E.* (German.) **Shrinkage of Aluminum Alloys in Sand Casting.** Hans Reininger. *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 326-337.

Seven Al alloys, chlorinated and unchlorinated, studied for surface and subsurface defects and hot tears. Two kinds of solidification—simple shell and skeleton-type—with different crystal formation, influence defect formation. Importance of temperature during casting (uneven distribution of heat favors defect formation: and solidification (freezing sensitivity). 27 ref. (E25n, E11; Al)

782-E.* (German.) **Synthetic Resins and Their Use in Foundries.** *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 338-339.

Synthetic resins used increasingly in patternmaking. Many have good mechanical properties, moisture and aging resistance, excellent adhesion on metals and stability. Advantages in general: quick and cheap to produce; unlimited capacity for copying; little wear. Care must be exercised during production because of tension sensitivity, lower fatigue limit and temperature dependence. Production of synthetic resin patterns. (E17)

783-E.* (Japanese.) **Recent Electrolytic Advances in Preparation of Molds.** N. Kinoshita.. *Metals,* v. 28, Sept. 1958, p. 694-699.

Electrodeposited metal layer on an electrode can be peeled off to make a replica of such things as optical diffraction gratings, records, objects of art, typographical plates, radar parts, jet engine parts and Venturi tubes. Thickness of deposited layer is 10^3 times that of plating. Speed of deposition is 0.1 to 2 mm. per hr. Cu, Ag, Ni, Fe, Co, Au, Zn and W alloys can be deposited. (E19)

784-E. Investment Casters Push Ceramic Shell Use. Ted Operhall. *Foundry,* v. 86, Oct. 1958, p. 68-70.

Commercial production of castings in ceramic shell molds has shown a number of advantages over use of investment molds. (E19c)

785-E. A Brass Foundry Can Have Good Working Conditions. William G. Gude. *Foundry,* v. 86, Oct. 1958, p. 76-79.

Sand preparation, molding, melting, pouring and shakeout operations. (E11, 18-67; Cu-n)

786-E. Quality Control Tests in the Shell Process. Earl W. Jahn. *Foundry,* v. 86, Oct. 1958, p. 80-81.

Checking the physical characteristics of shell molded castings and sand mixes can be simplified by use of a standard pattern to produce test castings and molds for making sand specimens. (E19c)

787-E. Mechanized Molding Matches Manual Skill. *Metalworking Production,* v. 102, Oct. 3, 1958, p. 1727-1732.

Molding and pouring are completely automatic in this installation. Only core setting remains a manual operation. Sand, mold density, flask filling, flask design. (E19, E21, 18-74; CI-s)

788-E. Interim Report on Vacuum Die Casting. *Precision Metal Molding,* v. 16, Oct. 1958, p. 62-63.

Advantages and disadvantages of the vacuum process. (E13, 1-73)

789-E. A New Hot Blast Cupola With Direct Recuperation of the Heat of the Exhaust Gases. G. Ulmer. *International Foundry Congress, Stockholm,* Paper no. 26, Aug. 19-24, 1957, p. 643-668. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 839.)

(E10a, W18d)

790-E. (German.) **Investigations Into the Shrinkage Behavior of Grey Cast Iron.** R. Ziegler. *Giesserei-Nachrichten,* no. 2, May 1957, p. 9, 10, 13-18, 21.

(E25n; CI-n)

791-E. Recent Developments in the Field of Steel Castings. W. A. Stauffer. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 508-519. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB95.)

Previously abstracted from original. See item 200-V, 1956.
(E-general; CI)

792-E. Contribution to the Theory of the Water-Glass Molding Method. (CO_2 Process.) Pt. 1. S. Bohmer. *Giessereitechnik,* v. 3, Jan. 1957, p. 6-9. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 838.)

Previously abstracted from original. See item 143-E, 1957.
(E19, E21)

793-E. (French.) **Manufacture and Use of Large Aluminum Die Castings. Pt. 3.** A. F. Bauer. *Revue de l'Aluminium,* July-Aug. 1958, p. 787-791.

(Concluded.) (E13; Al)

794-E. (Italian.) **How to Melt Aluminum Alloys Correctly.** *Fonderia,* v. 7, Aug. 1958, p. 356-360.
(E10; Al-b)

795-E. (Italian.) **The New G. Fischer Foundry.** *Fonderia,* v. 7, Aug. 1958, p. 337-342.

Completely automated foundry in Shaffhausen, Switzerland, designed by American and Swiss engineers, has two operating units, can produce 36,000 tons of malleable iron castings per year with labor force of only nine men involved in direct operations. Two automatic forming units produce a maximum of 300 complete forms per hr., or one every 12 sec. Facilities and procedures. (E11, W19; CI-s)

796-E. Mechanical Properties of Die-Cast Irons. G. K. Gedevanishvili and R. B. Zvenitskaya. *Liteinoe Proizvodstvo,* no. 3, Mar. 1958, p. 10-11. (Henry Brutcher, Altadena, Calif., Translation no. 4336.)

Previously abstracted from original. See item 384-E, 1958.
(E13, 3-74; CI)

797-E. Casting Uranium-5% Zirconium-1.5% Niobium Alloys Into Zirconium and Zircaloy-2 Containers. J. W. Frank and R. E. Macherey. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5442,* July 1958, 50 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.50.

Uranium and high-uranium alloys are bonded to Zr and Zr alloys by a direct casting method. Unalloyed U and U alloyed with 5% Zr and 1.5% Cb were cast into Zr and Zircaloy-2 molds of various shapes and sizes. Castings made in cans of circular cross section were well bonded and sound, provided the molds were out-gassed at elevated temperature before use and proper preheating precautions were observed. 9 ref. (E16, L22; U, Zr)

798-E. (Czech.) **Structural Changes on Casting Stainless Steel.** S. J. Maresh Skala. *Ceskoslovenska Stomtologie,* no. 2, 1957, p. 57-65.

Stainless steels with 18% Cr and 8% Ni, or with 14% Cr and 8% Ni, are used in dentistry. Increased content of C and inhomogeneity of structure produce brittleness and low corrosion stability of the steel. The present method of melting by electric arc leads to an increased C content, whether the usual or high-grade electrodes are used. The amount of carburization increases with rapid melting. A low C content was achieved only by autogenous (gaseous) melting. Structural inhomogeneities arising on casting were removed by annealing at 1150° for 2 hr. and subsequently quenching in water.
(E10, T10e, 17-57; SS)

799-E.* (German.) **Reasons for "Gassing" of Aluminum Castings.** H. Kessler. *Aluminium,* v. 34, Sept. 1958, p. 518-521.

Porosity of Al castings caused by hydrogen from combustion gases of the fuel or atmospheric moisture. Presence of hydrogen tested by putting a crucible with melt in a receptacle and slowly exhausting the air. Hydrogen, if present, changes surface appearance after solidification and cavities are found after sawing. Best way to remove hydrogen is to slowly supply chlorine in a "converter" or by carbon pipes under the surface. (E25s; Al, 9-68)

800-E.* (German.) **Dimensioning of Feeder Heads and Risers.** W. Koppe. *Giesserei,* v. 45, Aug. 14, 1958, p. 469-474.

General formula for computation of volume riser plus feeder head. Coefficients for different shapes of castings and different materials evident from tables. For cast iron, special correction factors taken into consideration because of the expansive precipitation of eutectic graphite. Dimensioning of gates.
(E22; CI)

801-E.* (Japanese.) **Molding Techniques in the Soviet Union.** *Metals,* v. 28, Oct. 1958, p. 769-771.

The most significant contributions are oxygen blow into the melting furnace, application of isotopes and gaseous molds. (E10, E19, 1-59)

802-E. Vacuum Die Casting Saves on Machining. *Design Engineering,* v. 4, Sept. 1958, p. 45-47.

Steps followed by Aurora Metal for vacuum die casting of aluminum bronze and silicon bronze.
(E13, 1-73; Au-s, *Si*)

803-E. A French Glossary for Foundrymen. Pt. 3. *British Cast Iron Research Association, Bulletin,* v. 14, Sept. 1958, p. 492-500.

(E-general, 11-67)

804-E. What Has Centrifugal Casting to Offer? *Design Engineering,* v. 4, Oct. 1958, p. 56-59.

Advantages of hollow cylindrical castings include homogeneity, density, thin, smooth walls, good cost factors. (E14)

805-E. Improved Facilities for the Production of Castings by the Mercast Process. *Machinery (London),* v. 93, Oct. 1, 1958, p. 777-780.

Mercast process of precision investment casting. Pattern and moldmaking shop, foundry and finishing department and toolroom are housed in a single building. Furnaces of different types are installed for melting high-alloy steels, Al and Cu-base alloys; a 56-lb. vacuum furnace is available for both casting and melting. Details of a complex built-up mold for production of mercury patterns for an intricate gas turbine component. (E15; Hg)

806-E. Hot Blast for Small Foundry Cupolas. *Mechanical World and Engineering Record,* v. 138, Aug. 1958, p. 362-363.

Installation of independently oil-fired hot blast equipment resulted in savings of coke, ferrosilicon and manganese, increased melting rate. (E10a, W18d)

807-E. The "Mercast" Process. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 361-362.

(E15; Hg)

808-E. Automatic Casting Cuts Costs. Pt. 2. *Metalworking Production,* v. 102, Oct. 10, 1958, p. 1771-1775.

(E-general, W19, 18-74; CI)

809-E. Molding Profit Cycle. J. N. Carter. *Modern Castings,* v. 34, Aug. 1958, p. 22-23.

(E16c)

810-E. Foundry Saves $29,448 a Year. *Steel,* v. 143, Oct. 20, 1958, p. 198-199.

New semi-automatic method of core manufacture requires less men, less handling time. (E19)

811-E. (German.) **Sand Preparation on the Foundry Floor.** Werner Riege. *Giesserei,* v. 45, Sept. 11, 1958, p. 587-589.

Advantages of preparing the sand on the foundry floor itself. Problem of sand circuit solved by roller trains, grap buckets, carts, movable belt elevators, movable sand slingers and power lift trucks. Small caterpillar trucks with grap buckets proved to be very useful. (E18, W19h, 18-67)

812-E. (Japanese.) **Properties of Molding Materials at High Temperature. Pt. 5. Stress Caused by Thermal Expansion.** Kunio Futaki and Mitsuo Isotani. *Government Industrial Research Institute, Nagoya, Reports,* v. 7, Aug. 1958, p. 570-576.

4 ref. (E18r)

813-E. (Russian.) **Improving Technology of Melting Alloys in Electric Furnaces.** A. F. Kablukovskii, Ya. S. Leizerov and I. P. Solodikhin. *Metallurg,* v. 3, Sept. 1958, p. 12-15.

Melting of Ni and Fe-base alloys of specific electrical resistance, Nichrome and Fe-Cr-Al alloys. Investigation conducted to reduce high labor expenditure, high spoilage rate and increase annual output. Production of Cr-Al alloy containing no more than 0.03% C and no more than 0.40% Si solved many difficulties. (E10r, Al, Cr, Fe, Vi)

814-E. (Russian.) **New Method of Metal Alloy Preparation.** G. I. Pogodin-Alekseev and V. V. Zaboleev-Zotov. *Liteinoe Proizvodstvo,* July 1958, p. 25-26.

Effect of ultrasonic waves on formation of hard alloys. Relation between changing frequencies of ultrasonic waves and uniformity and hardness of cast alloys. (E25, 1-74)

815 E.* Design of Cast Components. H. G. Goyns. *Engineer and Foundryman,* v. 23, July 1958, p. 54-66.

Mechanism of solidification, shrinkage and cooling stresses in cast steel and cast iron. (E25n; ST, 5-60, CI)

816-E.* (Russian.) **Effect of Pressure of Inert Gas in Melting Furnaces Upon the Gas Content of Molten Metal.** D. S. Kamenetskaya and A. N. Zelenov. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 27-28. (Henry Brutcher, Altadena, Calif., Translation no. 4353.)

Experiments conducted under vacuum and compared with results of inert gas atmosphere, using as test specimen Chromel melted in high-frequency induction furnace, without slag or deoxidizers (magnesite brick lining). By prolonging exposure of liquid metal in inert gas atmosphere, the gas content in the metal declines. By increasing the pressure of inert gases, an increase of gas content takes place. (E25s)

817-E.* Austenitic Manganese Steel. Hedley Thomas. *Castings,* v. 4, Sept. 1958, p. 13, 15, 17, 19, 21, 23.

Techniques employed in an Australian foundry. Melting; ladles and pouring; molds and cores; heat treatment; cleaning of castings; chemical control; physical testing; metallography. Two methods of manganese determination. (E11; AY, *Mn*)

818-E.* Radio Isotopes and Their Use in the Foundry. F. C. Pollard. *Castings,* v. 4, Sept. 1958, p. 25, 27.

Radio-tracer technique and photographic effect; use of beta and gamma rays in determining thickness. (E-general, 1-59, S14e)

819-E.* Precision Cast Aluminium Wave Guides. *Light Metals,* v. 21, Oct. 1958, p. 313-316.

Mercast process for manufacture of wave guide components requiring light weight, extreme accuracy of internal dimensions, dimensional stability, absence of porosity and surface defects, fine surface finish, minimum of costly machining proc-

esses, maximum strength.
(E15, X15q; Al)

820-E.* Use of Oxygen in the Malleable Air Furnace. *National Cylinder Gas, Information Report,* no. 14, Aug. 1958, 7 p.

O_2 injected into the pulverized coal-air mixture improves combustion, permits rapid oxidation of unwanted elements, improves slag and metal fluidity. (E10s; O, CI-s)

821-E.* Use of Nitrogen for Flushing Molten Metals. *National Cylinder Gas, Information Report,* no. 19, Aug. 1958, 8 p.

Advantages of N_2 as degassing, oxide removal agent; procedure, equipment, for eliminating porosity from Al castings.
(E25s, 9-68; Al-b, N)

822-E.* NCG Controlled Cupola Chemistry Process. *National Cylinder Gas, Information Report,* no. 13, June 1958, 8 p.

Process for oxygen injection. Advantages claimed include greater output of usable metal, increased alloy recovery, reduced coke consumption, less oxygen consumed.
(E10a; O, CI)

823-E.* (French.) **Cast Steel Chains With High Mechanical Properties.** Maurice Flour. *Fonderie,* no. 150, July 1958, p. 297-301.

Casting techniques and molds used; superiority of cast over welded chain. Suggested that French navy and other users of heavy-duty chain would do well to adopt cast product. (E11, T7e, 17-57; ST)

824-E.* (French.) **Fabrication of Light Alloy Pattern Plates Cast in Plaster Molds.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 97, June-July 1958, p. 2-7.

Plaster pattern plates formerly used for small-lot manual production were found unsuitable for vibration and pressure conditions of large-lot machine molding. Method was developed for molding light alloy pattern plates directly on plaster master plates having from 20 to 150 very small patterns made of babbitt metal cored into the plaster. Resultant pattern plates are precision products as shrinkage of light alloy is relatively low.
(E19, W19j, 17-57; Al, Mg)

825-E.* (French.) **Central Feeding With Horizontal Cold Chamber Pressure Casting Machines. Molds and Process.** K. A. Ritter. *Machine Moderne,* v. 52, Aug. 1958, p. 71-74.

Tools and techniques which, without requiring any change in mold or machine, permit use on horizontal chamber machines of molds designed for vertical chamber machines. (E13, 1-52)

826-E.* (German.) **Treatment of Aluminum Alloys With Chlorine.** Heinz Scheuten. *Giesserei,* v. 45, Oct. 9, 1958, p. 633-639.

Theoretical discussion of thermodynamic and chemical processes in refining of Al alloys through introduction of chlorine into the melt. Number of possible chemical reactions (with chlorine) is large. Temperature-dependence of reactions can be followed thermodynamically with the Gibbs-Helmholtz equation. Best ways of using chlorine in the gaseous state or as chlorine-releasing salts, for the refinement of Al in the melting process. Excess chlorine may lead to difficult-to-cast metal. 14 ref. (E25s; Al-b)

827-E.* (German.) **Oxygen-Enriched Blast Air in the Cupola Furnace.** *Giesserei-Praxis,* no. 9, May 10, 1958, p. 175.

Advantages: shortening of time between tappings, variable melt temperature, lower coke consumption. Yield increased 3 to 5% by the use of 3-4% additional oxygen.
(E10a)

828-E.* (German.) **New-Type Powder-Flame Cleaning of Castings.** *Giesserei-Praxis,* no. 9, May 10, 1958, p. 176-178.

Cleaning torch combines a fuel-gas-oxygen flame, a current of oxygen and a metallic powder air blast. The Griesheim powder-flame cutter is used in cutting cast iron and steel. Griesheim-powder-lance cleans ingot molds, cuts iron and other alloys as well as slags and refractory materials.
(E24, G22g, L10g)

829-E.* (German.) **Porous Castings Impregnated by the "Moguloid" Process.** *Giesserei-Praxis,* no. 9, May 10, 1958, p. 178-179.

Sealing with Mogul cast seal, a colloidal solution containing metal powder. Before application, the castings are treated by vacuum to remove air from the pores or cavities. Pressure tested at 700 atm., castings sealed by this process resist temperatures up to 400° C.
(E25q, E26, 9-68)

830-E.* (German.) **Spheroidal Graphite Iron.** Karl Kessler. *Industrieblatt,* v. 58, Aug. 1958, p. 363-367.

Heating temperatures and time, as well as cooling conditions, determine resulting properties (ductility, tensile strength, Brinell hardness). Heat treatment used in production of most spheroidal graphite castings. Structures (ferritic, ferritic-pearlitic, pearlitic), and characteristics of each. Welding spheroidal graphite iron, subsequent heat treatment and surface finishing procedures.
(E25q, J-general, K-general; CI-r)

831-E.* (German.) **Progress in the Field of Nodular Cast Irons.** H. Morrogh. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 20-22.

Pb, Cu, Sb, Bi and Ti, particularly when present in combination, can prevent Mg from having the desired nodulizing effect, but addition of Ce to give a retained Ce content of not less than about 0.002% permits effects of these subversive elements to be neutralized. Use of Ce in presence of Mg is now common practice. (E25q; CI-r)

832-E.* (Swedish.) **Feeding Compounds and Riser Insulation for Steel Casting.** Kurt Beckius. *Gjuteriet,* v. 48, Sept. 1958, p. 127-145.

"Kolfria" (95% silica; 5% oxides of Al, Fe, Ca, Mg and 0.16% P_2O_5), "Kolrika", 18.4-32.3% C; quartz + traces of oxides and metals and mixtures of Al chips, iron oxides, quartz with 0.3 to 1.4% C, or 3.6 to 15.4% respectively, are used in linings surrounding the risers or as a covering on top of the riser, to obtain a thermo-insulating effect that retards solidifying and eliminates piping. 18 ref. (E22q; ST, 9-67)

833-E.* (Dutch.) **Metal-Mold Reaction With Aluminum and Copper Alloys.** H. Boswinkel. *Metalen,* v. 13, June 30, 1958, p. 220-223.

Reaction of molten phosphor bronze or Al alloys containing Mg with the moisture or combined water present in sand molds, and the absorption of the gaseous products by the molten metal. Influence of P, Mg and other alloying elements on the metal-mold reaction and resulting porosity. Effect of pouring temperature, mold temperature and mold material on gas absorption. 10 ref. (E25n, 2-60, 2-61; Al-b, Cu-b, Mg, P, 5-60, 9-68)

834-E.* (Japanese.) **Relation Between Penetration or Blow and Back Pressure of Sand Mold.** Mototaka Mutaguchi. *Japan Foundrymen's Society, Journal,* v. 30, July 1958, p. 541-547.

Mercury used to investigate pressure of penetration or blow and relation between penetration and washes of sand molds. Pressure which caused penetration was inversely proportional to size of sand spacing. Pressure for penetration increased in the presence of back pressure. With back pressure beyond critical range blows occurred regardless of the state of the mold surface. (E19, E11, 3-74; NM-H5)

835-E.* (Japanese.) **Change of Mechanical Properties by Vacuum Melting of Cast Irons. Pt. 1.** Masao Kikuchi. *Japan Foundrymen's Society, Journal,* v. 30, July 1958, p. 553-559.

Flake graphite existing in each pig iron changed to fine eutectic graphite and the pearlitic matrix became ferritic. Tensile strength in general improved. The use of graphite crucibles increased the carbon in the molten iron and resulted in decreased tensile strength and precipitation of coarse flake graphite. 10 ref. (E10p, M27, Q27a, 1-73; CI)

836-E.* (Japanese.) **Some Experimental Studies of Magnesium Nodular Cast Iron by Reducing Refining in the Electric Arc Furnaces.** Masao Homma, Hiroshi Meguro, Yoshihiko Abe and Reiichi Ohno. *Japan Foundrymen's Society, Journal,* v. 30, Aug. 1958, p. 597-602.

In refining of cast iron in acid and basic electric arc furnaces the amount of Mg was smaller than required in cupola. Both types of furnaces gave excellent desulphurizing actions. Annealed castings from basic furnaces had tensile strengths of 40 to 48 kg. per sq. mm. and elongations of 10 to 15% while acid furnace gave same tensile strengths and elongations of 9 to 11%. 10 ref. (E10r, Q17a, CI-r)

837-E.* (Japanese.) **Relation Between Amount of Binder and Permeability.** Mototaka Mutaguchi. *Japan Foundrymen's Society, Journal,* v. 30, Aug. 1958, p. 608-612.

Factors affecting permeability of molds; formula expressing relationship of permeability with packing binders, sand grain size and percentage of sand grains retained. Results of permeability measurements on green and synthetic sand containing various amounts of binders were in good agreement with computed values. (E18r; NM-f45)

838-E.* (Japanese.) **Studies on Step Gates.** Kenji Chijiiwa. *Japan Foundrymen's Society, Journal,* v. 30, Aug. 1958, p. 612-618.

Fluidity of molten metal in castings to which step gates were attached. Effect of pouring rate and sizes of sprue ingate and casting on fluidity. With fast pouring the molten metal flowed back from the casting to sprue through the upper ingate if the diameter of the ingate was smaller than the sprue. This back flow was prevented by using a sprue diameter that was 80% of the diameter of ingate. If the pouring rate was slow the flow back was negligible when the diameter of the sprue and ingate were the same. (E22p)

839-E. **Quality Control of Melting Stock for Investment Founders.** L. S. Taylor. *Foundry Trade Journal,* v. 105, Oct. 16, 1958, p. 467-470.

Influence of tramp elements and vacuum melting on the quality of castings. (E10, 1-73, 3-69; ST)

840-E. **Protective Atmospheres for Teeming Alloy Steel.** P. Holtzhaussen and H. Fiedler. *Iron and Coal Trades Review,* v. 177, Sept. 26, 1958, p. 741-746. (From *Neue Hütte,* v. 2, Nov. 1957, p. 685-691.)

Previously abstracted from original. See item 226-E, 1958. (E23, E25; SS)

841-E. **What the Designer Should Know About Production. Pt. 3. Castings, Casting Design, and Foundry Methods.** Jack M. Tarnow. *Machinery,* v. 65, Nov. 1958, p. 154-162.

(E-general, 17-51, 17-55)

842-E. **Lost Wax Investment Casting.** *Machinery (London),* v. 93, Oct. 22, 1958, p. 941-948.

New precoating material developed for the wax trees, to eliminate "fusion", or "slag spots", which frequently occur when casting Cr alloys of the martensitic type. (E15)

843-E. **Use of the NOG Solid Materials Dispensing Unit in the Treatment of Molten Metals.** *National Cylinder Gas Information Report,* no. 17, Aug. 1958, 9 p.

Used for injecting $CaCO_2$ or other material for desulphurization, carbon, degassing and deoxidation agents; alloy additions into molten metal. Results in more effective use of additive, better metal agitation. (E25; CI-b)

844-E. **Efficiency of a Cupola Furnace.** H. Jungbluth. *Giesserei,* v. 43, Apr. 12, 1956, p. 180-184. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 311-E, 1956. (E10, CI)

845-E. (German.) **Molding Box Design.** W. G. Rathmann. *Giesserei,* v. 45, Sept. 25, 1958, p. 623-624.

Difficulties encountered in bolting together cope and drag; proposals to overcome difficulties. (E19, 17-51)

846-E. (German.) **Manufacture and Properties of Foundry Products From Iron-Base Alloys.** J. Goffart. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 26-28.

(E-general; Fe-b, 5-60)

847-E. **Co-Operation and Co-Ordination Between Pattern Shop and Foundry.** E. H. Beech and N. Bradshaw. *British Foundryman,* v. 51, Aug. 1958, p. 363-370.

Improved fabrication by new molding and casting techniques for various complicated parts. (E19, E17, E11; CI, 17-51)

848-E. **Aspects of Tropenas Converter Steel.** G. H. Ford. *British Foundryman,* v. 51, Aug. 1958, p. 396-398.

Construction details and operational procedure with reactions, advantages, disadvantages of method. (E10b, W18q; CN, AY)

849-E. **The Common Sense of Cupola Operation.** E. Dibden. *British Foundryman,* v. 51, Aug. 1958, p. 399-401.

Cupola size, melting rate, well depth, height of preheating zone; air requirements and preparation of sand bed, tap and slag hole; function of coke bed and effect of fluctuation of its height on metal chemistry; effect of blast volume on bed and melting rate. (E10a, W18d; ST, 17-52)

850-E. **Vacuum Melting Improves Investment Casting,** J. A. Miller. *Journal of Metals,* v. 10, Aug. 1958, p. 522-524.

5 ref. (E10, E15, 1-73)

851-E. Hot-Blast Cupola Finds Place in Steelworks. *Journal of Metals,* v. 10, Sept. 1958, p. 596-598.

Cupolas melt scrap for steelmaking furnaces in Germany. 5 ref. (E10a, D2a, D3g, 1-66)

852-E. Pinhole Porosity in High-Alloy Steel Castings. R. J. Mangone, A. M. Hall, W. T. Bryan and C. E. Sims. *Journal of Metals,* v. 10, Dec. 1958, p. 810-814.

Major variables affecting this phenomenon are H content of melt, pouring temperature and mold-moisture content. 5 ref. (E25n; SS-b, 5-60, 9-68)

853-E. Foundry Methods Switch Eliminates Hot Tears in Large Castings, Cuts Weld Time. Hubert Chappie. *Western Metalworking,* v. 16, Oct. 1958, p. 62-63.

In the production of 27,000-lb. steel press platens, five changes in practice were made. Use of a sand that absorbs expansion, multiple gating of correct thickness, external chills, favorable design. (E11, ST, 9-72)

SECTION F

PRIMARY MECHANICAL WORKING

1-F. Diamond Wire Drawing Dies. *Metal Industry,* v. 91, Oct. 25, 1957, p. 353-357.

Investigation into the performance of English and foreign dies. (To be continued.)
(F28, W24n, 1-52; NM-k 37)

2-F. (German.) **Computation of the Mean Deformation Resistance and of the Rolling Pressure Arising at Cold and Hot Rolling of Square Rods and Sheets.** A. Geleji. *Acta Technica,* v. 18, no. 1-2, 1957, p. 77-100.

Method for computing deformation resistance of hot and cold rolling; formulas and tables. (F23)

3-F. (Russian.) **Rolling of Rails With a Profile Groove in Blooming Mill Rolls.** N. I. Beda, G. P. Borisenko and M. P. Galemin. *Stal',* v. 17, May 1957, p. 431-435.

Using the fourth pass in blooming mill rolls for rail profiles where the split is staggered results in higher rate and a minimum of scrap due to fine cracks. 5 ref.
(F23, W28a, 1-52, T23q; ST)

4-F. (Russian.) **Experimental Determination of Stresses During Rolling.** V. N. Poturaev. *Stal',* v. 17, May 1957, p. 438-440.

Results obtained aid designers of equipment to calculate more accurately the requirements for new technological processes in which metal is deformed under pressure. (F2, F23, 17-51)

5-F. Industrial Diamonds in the Wire Mill. L. A. Zucker. *Industrial Diamond Review,* v. 17, Sept. 1957, p. 173-175, 179.

Practice at Union Wire Die Corp. (F28; 1-2, NM-k37)

6-F. Continuous Rolling: Fundamentals of Design and Calculation of Roll Speed. Z. Wusatowski. *Iron and Steel,* v. 30, Nov. 1957, p. 609-610, 617.
(F23, 1-61, 17-51)

7-F. Diamond Wire Drawing Dies (Concluded). *Metal Industry,* v. 91, Nov. 1, 1957, p. 379-381.

Mountings, die contours, die characteristics, X-ray examination.
(F28, W24n; NM-k37)

8-F. Heavy Flanged Forgings Fully Formed With Split Die. *Metalworking,* v. 8, Nov. 1957, p. 10-11.

Split-die method used for pipe fittings of high-pressure oil and gas wells gives fully formed forgings to precise dimensions with grain flow that gives the greatest strength. (F22, T6a; ST)

9-F. Welded Structure Improved by Forging. W. Wollering and E. Lundby. *SAE Journal,* v. 65, Oct. 1957, p. 122, 125.
(F22; 7-51)

10-F. (German.) **Problems in the Drive and Control of Straight Multiple Wiredrawing Machines.** F. Liekmeier. *Draht,* v. 8, Aug. 1957, p. 282-285.

Control of the drive units is governed by the drawing force and a counterforce originating in the next following drum. The variable speed of drums can be obtained through differential gears, through a-c. and d-c. motors in different arrangements and with electronic devices. (F28, 1-52)

11-F. (German.) **Production of Copper Wire.** H. D. Feldman. *Draht,* v. 8, Aug. 1957, p. 310-312.

Change in tensile strength after various forming processes and heat treatments; pressing, washing, welding and drawing ratios influence the properties of the final product. Defects have their cause in the foundry or in the drawing process. 7 ref. (F28; Cu)

12-F. (German.) **Cold Rolling.** Werner Lueg and Paul Funke, Jr. *Stahl und Eisen,* v. 77, Oct. 3, 1957, p. 1356-1362.

Calculation of the effect of rolling speed on the rolling effort and strip thickness. 9 ref. (F23, 3-67)

13-F. (German.) **Lubricants and Steel Wire Drawing. Pt. 3.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1368-1374.

Phosphate, oil and Si lubrication. 11 ref. (F28; ST, NM-h)

14-F. (Polish.) **Rolling and Heat Treatment of Textured Transformer Plates.** A. G. Petrenko. *Hutnik,* v. 24, July-Aug. 1957, p. 277-282.

Influence of silicon and carbon content, grain size and production techniques upon magnetic properties and plasticity of cold rolled transformer plates; technology applied in U.S.S.R.
(F23, P16, Q24; SGA-r, AY)

15-F. (Russian.) **Forging and Stamping of Heat Resistant Alloys.** D. I. Berezhovskii. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 50-61.

Reviews foreign publications on metallurgy, technology and preliminary treatment of heat resistant ingots used in forging or stamping of turbine blades, rotors and other parts. 18 ref. (F22, G3; SKA-h)

16-F. (Russian.) **Graph of Faster Feeding of Hot Metal Into Blooming Mills.** V. S. Kaprov and D. P. Zhidetskii. *Metallurg,* v. 2, July 1957, p. 24-26.

A new, faster process of handling both killed and rimmed steel billets between casting and rolling.
(F23n, W12, 1-52; ST)

17-F. **Cored 90-Mm. Gun Tubes Extruded in 5 Minutes.** Henry J. Decelle, Adam A. Krystofik and John Penrose. *American Machinist,* v. 101, Nov. 18, 1957, p. 158-161.

(F24a, T2m; ST)

18-F. **Multiple Cold Drawing of Tubes With Phosphating—Methods in the U.S.S.R.** *Corrosion Prevention and Control,* v. 4, Oct. 1957, p. 59-60, (From *Stal',* v. 17, no. 3, 1957, p. 243).

Previously abstracted from original. See item 152-F, 1957.
(F26r; NM-h)

19-F. **Operation of a Canadian Strip Mill.** R. J. Barry. *Iron and Steel Engineer,* v. 34, Nov. 1957, p. 90-95.

At the Steel Co. of Canada.
(F23, 1-52, 4-53; ST)

20-F. **Billet Heating—New Johnstown Rod Mill.** F. R. Pullen. *Iron and Steel Engineer,* v. 34, Nov. 1957, p. 134-140.

New furnace has hourly tonnage rate of over 60 tons at the Johnstown plant of Bethlehem Steel Co.
(F21b; ST, 4-52)

21-F. **Hot Extruded Steel Shapes Can Save You Money.** R. L. Hugo. *Materials in Design Engineering,* v. 46, Nov. 1957, p. 124-125.

(F24; ST)

22-F. **Wrought Titanium.** J. R. Crane. *Metal Industry,* v. 91, Nov. 22, 1957, p. 435-438, 444.

Melting; fabrication factors; forging; machining. (To be continued.)
(F22, C21, G17; Ti)

23-F. **Production of Forgings at the Bromsgrove Works of Garringtons Ltd.** *Metal Treatment and Drop Forging,* v. 24, Nov. 1957, p. 459-464.

For such components as gear blanks and connecting rods.
(F22; ST)

24-F. **Development of a Process to Produce Zirconium. Hanford-Type Process Tubing by Roll Forming and Inert Arc Welding.** R. A. Noland and G. B. O'Keeffe. Argonne National Laboratory. *U. S. Atomic Energy Commission,* ANL-5110, May 1, 1953, 43 p. (CMA)

(F26s; Zr)

25-F. **Extrusion of Arc Melted Sponge Hafnium Cruciform Shapes.** J. Halapatz. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-MDM-7, May 5, 1954, 10 p. (CMA)

(F24; Hf)

26-F. **Casting and Fabrication of Binary Alloys of Uranium With Molybdenum, Aluminum, Silicon, Titanium and Vanadium.** R. E. Macherey and R. J. Dunworth. Argonne National Laboratory. *U. S. Atomic Energy Commission,* ANL-5341, June 15, 1956, 24 p. (CMA)

(F23, C5; U, *Mo, Al, Si, Ti, V*)

27-F. **Lubrication in Wire Drawing.** J. G. Wistreich. *Wire Industry,* v. 24, Oct. 1957, p. 954-958.

Conditions in die, methods of lubrication, forced lubrication and performance of die. (To be continued.)
(F28; 18-73)

28-F. (German.) **Layout of High Capacity Rolling Mills for Steel Sections and Wire Rod.** Hans Peter Lemm. *Stahl und Eisen,* v. 77, Sept. 1957, p. 1181-1195.

Comparison of semicontinuous and continuous plants; handling and treating billets charged into continuous rolling mill trains. 5 ref. (F23q, W23d; 4-53, 4-57, 18-67; ST)

29-F. (Russian.) **Cooling Technology for Rolled Stock Sensitive to Flaking.** D. A. Litvinienko, V. V. Turitsyn and P. N. Sporyshkov. *Metallurg,* v. 2, July 1957, p. 23-24.

New, shorter cooling schedules for steels sensitive to flaking on rolling. (F23; ST, 9-70)

30-F. (German.) **Forging Technique.** Otto Kienzle and Kurt Lange. *VDI Zeitschrift,* v. 99, Aug. 1957, p. 1197-1199.

Literature review. 47 ref. (F22)

31-F.* (Portuguese.) **Characteristics of Cold Rolled Thin Sheet Steel Manufactured by Cia. Siderurgica Nacional.** Sylvio E. Friedrich. *ABM, Associacao Brasileira de Metais, Boletim,* v. 13, July 1957, p. 245-266.

Cold rolling practice at Volta Redonda Works, only Brazilian producer of cold rolled sheet; types of steel used and requirements for subsequent deep drawing; control methods and use of metallographic tests; desirable characteristics of sheet for enameling and other special applications; finishing operations. 5 ref. (F23, 1-67; ST, 4-53)

32-F. Roll Pass Design for Combination Structural and Wide Flange Beam Mill. Herman E. Muller. *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 85-98.

Inland has successfully combined rolling of wide flange beams with the units that comprised their standard mill facilities; modernization of existing 28-in. structural mill has been completed and procedures developed for producing salable sections; methods of rolling and roll design were interwoven with the mill modernization program. (F23, W23k, 17-51; ST)

33-F. Greater Flexibility for Wire Drawing. Maurice A. Nye and Robert C. Suttle. *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 98-109.

Individual generators and electronic regulators provide high speeds in excess of 4000 ft. per min. at Steel Co. of Canada's new Parkdale works. (F28, W24; ST)

34-F. Modern Rod and Merchant Mill. W. R. Potts and R. M. Lang. *Iron and Steel Engineer,* v. 34, Dec. 1957, p. 161-172.

Layout, design and equipment at Atlantic Steel Co., Atlanta, Ga. (F27, W23d, 18-67; ST)

35-F. Automatic Strip Control. *Metal Industry,* v. 91, Dec. 6, 1957, p. 475-476.

(F23, ST, 18-74; 4-53)

36-F. Wrought Titanium. J. R. Crane. *Metal Industry,* v. 91, Dec. 6, 1957, p. 483-484.

Wire production; extrusion; tube production; joining. (F24, F26, F28, K general; Ti)

37-F.* Heavy Press Forgings for Aircraft. E. C. Wright. *Metal Progress,* v. 72, Dec. 1957, p. 105-110.

Hydraulic presses of 35,000 and 50,000-ton capacity make Al forgings of record size. However, the higher pressures produce the smaller forgings to much closer dimensional tolerances, thus reducing weight of forgings one-half and final machining time to one-eighth. (F22, W22p, 1-2; Al)

38-F.* Larger Precision Titanium Forgings. J. J. Russ. *Metal Progress,* v. 72, Dec. 1957, p. 136. (Digest from "Present Limitations and Future Possibilities in Titanium Forgings", ASM Titanium Conference, Los Angeles, Mar. 25-29, 1957.)

In comparing Ti and 4130 steel for the production of semi-precision and precision forgings it is found that Ti parts are restricted to two-thirds the size of steel forgings; internal and external draft angles must be greater for Ti, minimum rib widths and corner radii should be slightly greater in Ti as should minimum fillet radii. (F22, 17-51; Ti)

39-F. (Czech.) **Examples of Rolling Mill Equipment Standardization.** Josef Vanicek. *Hutincké Listy,* v. 12, Oct. 1957, p. 887-880.

Standards for two and three-roll mills producing ingots and sections. (F23, W23, S22; ST)

40-F. (German.) **Methods Used in Measuring the Characteristic Data in Rolling Blooms. Pt. 1.** Hans Günter Müller and Hans-Jürgen Marx. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1577-1582.

6 ref. (F23, W23a, 4-52; ST)

41-F. (German.) **Forces Encountered in Rolling Blooms. Pt. 2.** Hans Günter Müller and Werner Lueg. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1583-1593.

5 ref. (F23, W23a, 4-52; ST)

42-F.* (Russian.) **Influence of the Shape of the Skelp Edges on the Seam**

Strength of Welded Tubes. E. M. Tsigankov. *Stal'*, v. 17, Aug. 1957, p. 728-730.

Investigation of tube welding with the skelp edges cut at different angles. The tubes with right angle skelp edges are the best. (F26p)

43-F. Extrusion Press Tooling. Pt. 1. Press Operation. Richard Baugh and John Lyons. *Light Metal Age,* v. 15, Dec. 1957, p. 19-20.

Explores problems to improve the techniques of producing high-quality 6063T5 Al extrusions when circle size approaches 85% of container size. (F24; Al)

44-F.* Influence of Extrusion Variables and Alloying Additions on the Grain-Size and Structural Stability of Extruded Lead. J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 145-154.

Influence of extrusion temperature, speed and extrusion ratio on the grain-size of air-cooled and water-quenched commercially pure lead rods and pipes. Effect of small additions of Sb, Cu and Sn; resistance to grain growth at various temperatures of these extruded products measured. Stability of the extruded structure shows a dependence on alloying behavior and is related to the original grain size of the alloy. 6 ref. (F24, N3; Pb)

45-F.* How Iron Affects Forgeability of Copper Alloys. C. H. Hannon. *Iron Age,* v. 180, Nov. 7, 1957, p. 125-127.

Effects of iron additions, pouring temperature, cooling rate and silicon content on hot forgability and microstructure of ingots of copper alloy containing Al, Ni and Si. (F22, 17-52, 2-60, M27; Cu, *Al, Ni, Si*)

46-F. Forgeability Tests: Are the Results Reliable? P. M. Unterweiser. *Iron Age,* v. 180, Nov. 14, 1957, p. 153-156.

Forgability and forgability tests; flow stress, ductility, friction coefficient and other factors in the study of forgability. (F22, 17-52, 1-54)

47-F.* Planetary Hot Mill. D. McQueen Potter. *Iron and Steel,* v. 30, Oct. 1957, p. 475-482.

Details of new Sendzimir hot planetary mill; operations whereby single pass reductions of more than 90% are made in hot rolling strips of mild alloy or stainless steels giving tolerances comparable to cold rolling and good surface finish. (To be concluded.) 10 ref. (F23, 1-66, 1-52; AY, SS, 4-53)

48-F. Planetary Hot Mill. D. M. Potter. *Iron and Steel,* v. 30, Nov. 1957, p. 587-590.

Operation of Sendzimir hot planetary rolling mill. Comparison of mechanical properties of strip rolled from rimming steel slabs by planetary mill or by conventional mill as hot rolled and after subsequent cold rolling. (Conclusion.) (F23, 1-66; ST, 4-53)

49-F. Continuous Rolling. Z. Wusatowski. *Iron and Steel,* v. 30, Nov. 1957, p. 609-610.

(F23, 1-61; ST)

50-F. Lubrication in Wire-Drawing. Pt. 2. J. G. Wistreich. *Wire Industry,* v. 24, Nov. 1957, p. 1027-1029, 1046.

Factors affecting flow of soap powders. 16 ref. (F28, 18-73)

51-F. Mechanical Descaling and Drawing of Mild Steel Rod. L. Marsden. *Wire Industry,* v. 24, no. 287, p. 1039-1046.

(F27, L10, 4-61; CN)

52-F. (Russian.) **Forging in the Uralmashzavod.** I. S. Kvater. *Metallovedenie i Obrabotka Metallov,* no. 11, Nov. 1957, p. 72-76.

(F22)

53-F. (Russian.) **Utilization of Reserve Friction Forces on Blooming Mill Rolling.** B. P. Bakhtinov. *Stal',* v. 17, Sept. 1957, p. 805-809.

Use of reserve friction forces in blooming mill operation leads to a considerable increase of efficiency. (F23n, 4-52; ST)

54-F. (Russian.) **Influence of Cold Rolling Upon Properties of 8% Chromium Steels.** V. G. Dyakov. *Stal',* v. 17, Sept. 1957, p. 837-840.

7 ref. (F23, 1-67; SS, *Cr*)

55-F. Impact Extrusion Depth-to-Diameter Ratio is 32:1. John R. Saul. *American Machinist,* v. 101, Dec. 30, 1957, p. 69-71.

Aluminum rocket tube 8 ft. long extruded and chem-milled. (F24a, G24b, T2p, 17-57; Al)

56-F.* Planetary Mill Rolling. Some Practical Aspects. H. W. Ward. *Iron and Steel,* v. 31, Jan. 1958, p. 25-27.

In 1 sec. no less than 77 pairs of work rolls have each performed a small reduction and in 1 hr. well over a quarter of a million (277,200) light reductions have taken place to produce between 10 and 14 tons of strip. Roll life is remarkably good since each work roll is only in

contact with hot steel for about 7% of the time. During the remaining 93% of the time the work roll is revolving around the back-up roll in a deluge of cooling water so that the rolls are kept cool and retain their high surface finish. (F23, W23k, 1-52; ST, 4-53)

57-F.* The Planetary Mill and Its Uses. T. Sendzimir. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 95-101.

Planetary rolling is "cyclic" rolling or discontinuous rolling, where a roll first enters contact with the unworked portion of the material and then gradually works down, taking a rolling pass along the deformation zone and finally breaking contact with the material at the place where the material has reached its final thickness. (F23, 1-52; ST, 4-53)

58-F.* Flat Rolling. Effect of Plant Design and Layout on Capital and Operating Costs. W. F. Cartwright and M. F. Dowding. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 23-35.

Four typical installations for producing flat rolled products. Qualities and grades of products defined; the use to which the end product is put defines the combination of these. No one plant can produce the full range of qualities; limitations of each. Operating costs of each plant tabulated. (F23, 17-53; ST)

59-F.* Precision Forging. H. L. Showalter. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 615-624, 646.

Vertical and horizontal machines, their forging mechanisms, adjustment and control systems; typical forging cycles, setup practice, temperature control and lubrication of German developed precision forging process; application of hot and cold forging processes. (F22, W22)

60-F. Finish Rolling of Cast Iron Ways for Machine Tools. W. Iwascheff. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 94-95.

(F23q, W25, 17-57; CI)

61-F. Switch to Forging Beefs Up Products. Howard E. Jackson. *Western Metalworking,* v. 15, Dec. 1957, p. 52-53.

Forgings replace castings to give strength, toughness to caterpillar rollers at Schmitt Steel Co. (F22n, W22q, 4-51; ST)

62-F. Lubricants for Wire-Drawing Dies. W. M. Halliday. *Wire Industry,* v. 24, Dec. 1957, p. 1145-1149, 1153.

Recommendations for die design and requirements for lubricants. (F28h; NM-h)

63-F. (German.) **Precision Steel Pipe —Seamless and Welded.** Eduard Schulte. *Industrie-Anzeiger,* v. 79, Oct. 11, 1957, p. 1245-1246.

(F26; ST, 4-60)

64-F. (Russian.) **Growth of Rolling Mill Production.** B. S. Shapiro. *Stal',* v. 17, Nov. 1957, p. 992-996.

(F23, A4; ST)

65-F. (Russian.) **Tube Industry in the U.S.S.R.** Yu. M. Matveev. *Stal',* v. 17, Nov. 1957, p. 997-1005.

(F26)

66-F. (Russian.) **Wire Production for Industrial Use.** N. I. Kadikov. *Stal',* v. 17, Nov. 1957, p. 1014-1016.

Development of the wiredrawing industry in the U.S.S.R. Its products are used for reinforcing rods in concrete, in the manufacture of bolts, springs and chains. Several research organizations specialize in solving its problems. (F28, 17-57, T7)

67-F. Foil Laboratory Developments. *Metal Industry,* v. 92, Jan. 10, 1958, p. 26.

Current developments at Star Aluminium Co., Ltd. (F23; Al, 4-56)

68-F. (French.) **Special Pipe for the Gas Field of Lacq, France.** A. Madrelle. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 327-330.

Steels with high elastic limit are embrittled by the H_2S rich gas of Lacq. Manufacture of pipe and control tests. 6 ref. (F26, Q26s; ST, 4-60)

69-F.* (German.) **Investigation of Rolling Oils and Oil Emulsions in Cold Rolling Test.** Werner Lueg, Paul Funke, Jr., and Winfrid Dahl. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1817-1830. (Henry Brutcher, Altadena, Calif., Translation no. 4100.)

Pure base oils and additions. Testing equipment, measuring methods, materials. Test results: strip thickness, rolling effort, torque and forward slip. Relation between lubricating effect and characteristics. 27 ref. (F23, 1-67, 18-73; ST, NM-h)

70-F.* (Italian.) **Modern Trends in Rolling of Alloy Steels.** N. Cremonese. *Metallurgia Italiana,* v. 49, Nov. 1957, p. 763-773.

Heating equipment, plant layout, types of stands and roll design as influenced by types of shapes required and variety in mechanical

properties of alloy steels.
(F23, W23; SS, TS)

71-F. (Polish.) **Influence of Rolling Reduction Ratio Upon Quality of Flat Blooms.** W. Leskiewicz. *Hutnik,* v. 24, Sept. 1957, p. 349-355.

Advantages of applying high rolling reduction ratios. Investigation of three different operations with progressively increasing rolling reduction ratios and their influence upon tensile and impact strength of the flat blooms. (F23n, W23a, 4-52)

72-F. (Russian.) **Heating of Alloy Steel Ingots in Recuperative Soaking Pits.** O. A. Semchenko, A. N. Baibuz, N. I. Medvedeva and A. T. Azarov. *Stal',* v. 17, Oct. 1957, p. 915-917.

Investigation of temperature drop along the cross-section of the ingots. Prevention of ingot defect formation due to uneven heat distribution. (F21b, W20g; AY, 5-59)

73-F. (Russian.) **Production of Hot Rolled Plates in High-Alloy X18H25C2 Steel.** V. A. Filonov, F. A. Ksenzuk, V. N. Lola and A. L. Khudas. *Stal',* v. 17, Oct. 1957, p. 917-918.

Composition of the steel, recommended conditions of hot rolling with emphasis on as high a temperature as possible. (F23q, 1-66, 5-53; SS)

74-F. (Russian.) **Technology of Heat Resistant Alloy Rolling.** I. P. Zabaluev, V. I. Travinin and M. A. Kovaleva. *Stal',* v. 17, Oct. 1957, p. 919-923.

Choice of roll calibration. Choice of billet temperature on rolling. Quality control of the alloy.
(F23, 2-62; SAG-h)

75-F. (Russian.) **Causes of Wrinkle Formation on Rolling of Round Rods on Heavy Caliber Mills.** S. Z. Yudovich and M. S. Kanev. *Stal',* v. 17, Oct. 1957, p. 924-928.

Proper design of rolls is recommended as a major single contributing factor to prevention of surface defects in rolling.
(F23q, W23k, 17-51; ST, 5-55, 9-71)

76-F.* **Influence of Extrusion Variables and Alloying Additions on the Grain-Size and Structural Stability of Extruded Lead.** J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 145-154.

Influence of extrusion temperature, speed, and extrusion ratio on the grain-size of air-cooled and water-quenched commercially pure Pb rods and pipes. Effect of small additions of Sb, Cu and Sn, and resistance to grain growth at various temperatures of these extruded products. Extrusion temperature has a marked influence on grain size. Small additions of alloying elements diminish the grain size of water-quenched pipe, but their influence on the grain size of air-cooled material is determined by their alloying characteristics. The stability of the extruded structure also shows a dependence on alloying behavior and is related to the original grain size of the alloy. 6 ref.
(F24, M27c, 2-60; Pb)

77-F. Automated Line Adjusts Easily to Design Changes. R. H. Eshelman. *Iron Age,* v. 180, Dec. 5, 1958, p. 144-146.

Planning and standardized dimension of tubes allow automated line to be modified to meet design changes. (F26p, 18-74)

78-F. Press-Form Metal Tubing With Simple Dies. Federico Strasser. *Iron Age,* v. 180, Dec. 12, 1957, p. 127-129.

Basic types of dies and production of short length of tubing from flat pieces of sheet metals. Illustrates variety of closures and cross sections. (F26r, W24n)

79-F. Technique of Forging. O. Kienzle and K. Lange. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 22-24.

Review of 1956 literature.
(F22, 10-54)

80-F. Cold Rolling of Extra-Hard Carbon Steel, and Its Influence on Heat Treatments Involving Quenching. M. Massin. *Sheet Metal Industries,* v. 34, Dec. 1957, p. 929-940.

8 ref. (F23q, 1-67, 2-64; CN)

81-F. Swagers Point, Form, Assemble. *Steel,* v. 141, Dec. 9, 1957, p. 157-160.

Advantages of swaging for internal threading, internal forming, assembling, pointing, tapering and straight reduction on a variety of metal parts. (F25)

82-F. Fusion Welding in Pipe Fabrication. W. S. Schaefer. *Welding Engineer,* v. 43, Feb. 1958, p. 34-36.

(F26p; 4-60, ST)

83-F. (German.) **Power Requirement in Drawing of Steel Rod.** L. Möckel. *Fertigungstechnik,* v. 7, Dec. 1957, p. 537-543.

Experimental technique in determination of traction power. The formula of Siebel can be used but theoretical values are lower than the actual ones. The traction power is independent of speed of drawing. (F27, 4-55; ST)

84-F. (German.) **Drawing and Upsetting of Cold Rolled Steel Bars.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1795-1802.

Review of materials and methods; forces involved. Comparison of test results. Springiness; hardness determinations. 19 ref.
(F27, F22j; ST, 4-55)

85-F. (Swedish.) **Economic Considerations in Connection With Machining of Rolls.** Hans Warrol. *Jernkontorets Annaler,* v. 141, Nov. 1957, p. 798-803.

For rolling high-grade steel rod, turned rolls were found economically superior to ground rolls, especially for rolls with high surface hardness. (F23q, W23k, G17a; ST)

86-F. Induction Heating for Forging. P. E. Hammarlund and Y. Sundberg. *ASEA Journal,* v. 30, no. 10, 1957, p. 127-134.

New applications of induction heating in modernization of forge shops. (F21b, 1-52, 1-69, F22)

87-F. Aluminium Extrusion Plant at Pietermaritzburg. *Engineer,* v. 204, Dec. 20, 1957, p. 912-914.

(F24, 18-67; Al)

88-F. Manufacture of Tin Plates in India. Y. A. Gopal Rao. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 223-229.

6 ref. (F23, L16; ST, *Sn,* 4-53)

89-F. Heating at High Speed. Norman H. Davies and Richard J. Reed. *Metal Progress,* v. 73, Feb. 1958, p. 79-84.

High-speed heating of metal requires both convection and radiation from furnace gases and walls considerably hotter than finishing temperature. Consequently, fast controls are necessary to prevent overheating the work if the production line slows down. (F21b, W20h, P11k)

90-F.* Modernization in Heating for Hot Forming. Philip W. Morse. *Metal Progress,* v. 73, Feb. 1958, p. 85-90.

A 60-cycle 3-phase current can economically heat billets for forging, upsetting or extrusion. After the magnetic change point is passed, 960-cycle coils—dual purpose—carry the temperature higher. Higher frequencies are used for smaller billets. Several completely automatic systems are described.
(F21b, W28s; ST, Mg, 4-52)

91-F.* Influence of Forging Temperature on Mechanical Properties of Al-V Titanium Alloys. L. S. Croan and F. J. Rizzitano. *American Society for Metals, Transactions,* v. 51, Preprint no. 75, 1957, 26 p.

Effects of forging temperature on the mechanical properties after heat treatment of several heats of 6% Al, 4% V and 7% Al, 4% V titanium alloys. A high-temperature production forging technique involving press forging from above the beta transus temperature and water quenching from the press has been developed. Toughness, as measured by V-notch Charpy impact resistance at −40° F. may be increased by as much as 50% without any significant effect on strength. Although a gradual loss in ductility results from the use of increasingly high forging temperatures, the loss is insignificant at the working temperatures recommended.
(F22, 2-61, Q27a, Q23p; Ti, *Al, V*)

92-F.* 'Controlled Cooling' of Hot Ingots in a Single-Ingot Pit at Appleby-Frodingham. A. Jackson, N. H. Turner and R. C. Walthew. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 114-118.

General application of the method depends on the deviation from expected casting and stripping times and from the intended sequence of rolling being reasonably controlled. Under these conditions the fuel consumption per ton of ingot may tend to go down towards 0.3 therms per ton as against the approximate 3 therms per ton consumed in the latest gas soakers installed, when dealing under similar conditions with ingots of equivalent track times. (F21b; ST, 5-54)

93-F. Roll-Separating Force and Minimum Thickness of Cold-Rolled Strips. K. Tong and G. Sachs. *Journal of Mechanics and Physics of Solids,* v. 6, no. 1, 1957, p. 35-46.

Theory for predicting roll-separating forces is based on concept that the process of plastic deformation in rolling may be approximated by that of the plane-strain compression between parallel plates. Method for determining coefficient of friction and flow stress of materials. 14 ref. (F23, Q24, Q9n; Cu, 4-53)

94-F.* Production and Conversion of Aluminium Foil. J. R. Green. *Metallurgia,* v. 57, Feb. 1958, p. 71-73.

Foil production, foil stock, rolling, separation, annealing, properties and applications. (F23; Al, 4-56)

95-F. (Hungarian.) **Calculation of Deformation Resistance in Hot and Cold Rolling.** Sandor Geleji. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 145-150.

Resistance could be determined by experiment only. 12 ref. (F23)

96-F. (Hungarian.) **Calibration of Rolls for Pipes With Constant Internal and Variable External Diameters.** Jenö Gati. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 170-175.

New rolling technology for pipes having varying profiles. 4 ref. (F26s, S23)

97-F.* **Canadian Picture on Pipe, Tubing and Casting.** D. A. Adamson. *Canadian Mining and Metallurgical Bulletin,* v. 51, Feb. 1958, p. 102-107.

Continuous butt welding, electric resistance welding, submerged arc welding, seamless tube forming processes in various Canadian plants. Mannesmenn process for making seamles tubing. Size and tonnage capacities of the plants. (F26, 10-55)

98-F.* **Designing for Cored Forgings.** Carl J. Pfeifer. *Materials in Design Engineering,* v. 47, Feb. 1958, p. 122-124.

A cored forging is produced by a combination of closed die forging and extrusion. The special press required is equipped with mechanisms to introduce core pins, mechanically, immediately before pressure is exerted on the hot metal. The metal is forced to flow by displacement, filling the cavity and at the same time extruding around the cores to form cavities. (F22k, 17-51)

99-F. **Lubricants for Wire-Drawing Dies. Pt. 2.** W. M. Halliday. *Wire Industry,* v. 25, Jan. 1958, p. 59-62.

(Conclusion.) (F28, W24n; NM-h)

100-F. (German.) **Use of Fuel Oil in Forging Plants.** Karl-Heinz Weber. *Stahl und Eisen,* v. 78, Jan. 23, 1958, p. 87-93.

(F21b, W20h, 1-55; RM-k30)

101-F. (Hungarian.) **Determination of the Velocity of Deformation in Extrusion and Drawing.** Jozsef Kocsis. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 71-75.

(F24, F27, F28, G4, 3-67)

102-F. (Hungarian.) **Extrusion Failures in Nonferrous Semifinished Products.** Zoltan Hegedüs. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 75-79.

12 ref. (F24, 9; EG-a38)

103-F.* (Italian.) **Defects in Light Alloy Forgings and Stampings.** Eugenio Hugony. *Rivista di Meccanica,* v. 8, Nov. 23, 1957, p. 37-39.

Defects in parts submitted to Light Metals Experimental Institute, Milan, were analyzed as follows: Part made of Al-Cu-Mg alloy had cracks and blisters caused respectively by improper heating conditions during forging, and overheating during heat treatment; part in Al-Si-Mg alloy had developed blisters due to inclusions during melting and casting of original metal; group of difficult-to-machine parts in Al-Si-Mg alloy had not been properly tempered, contained foundry inclusions. (F22, C5, 9-72, 9-69; Al)

104-F.* (Swedish.) **Determination of Die Wear in Wiredrawing With Radioactive Isotopes.** Erik Lindstrand. *Jernkontorets Annaler,* v. 141, Dec. 1957, p. 837-846.

Mild steel wire was drawn through three irradiated tungsten carbide dies. Arc-shaped shavings from a third of the wire periphery were packed in scintillation detector. Count rates from tests performed with different coatings and lubricants showed amount of wear debris ranged from 0.5×10^{-8} to 5×10^{-8} g. per m. of drawn wire. (F28, Q9, X2c, W24n, 1-59)

105-F.* (German.) **Finish Rolling of Cylindrical Trunnions With Diameter of 1.5-5 Mm. by Plunge Method.** G. Pahlitzsch and H. J. von Eitzen. *Werkstattstechnik und Maschinenbau,* v. 47, Nov. 1957, p. 589-597.

Mechanism of finish rolling; technique of rolling small articles. Stress in worked article; construction of finishing rolls; influence of working conditions; influence of properties of materials. Adherence to standard tolerances. (F23q, W23k, 1-52)

106-F.* **Rolls and Rolling. Sheet Piling.** E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 46, Mar. 1958, p. 310-312, 337, 339, 341, 345-348.

Rolling techniques and roll design requirements for production of sheet piling. (F23; ST, 4-55)

107-F. **Primary Roll Neck Bearings and Their Protection.** George Sackerson. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 103-110.

In order to get maximum bearing life, polished roll necks, plentiful, clean, cool water for cooling, a dependable source of grease, and scale guards are necessary. Accurate

maintenance records are required to insure replacement when required. (F23, W23m; ST, NM-h)

108-F.* Seamless Tube Making by the Calmes Process. Albert Calmes and Clyde A. Roberts. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 124-132.

Ingots are taken directly from the openhearth and made into seamless tubing in one continuous process. Principal steps are: ingot heating, press piercing, elongating, rotary forging, reheating, sizing, polishing, finishing and testing. (F26; ST)

109-F. J & L Starts Operation of 44-In. Mill at Aliquippa. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 164-165, 169-170.

A semicontinuous hot strip rolling mill produces coils up to 40 in. wide and weighing 20,000 lb. Operation is nearly automatic, the rolling being controlled by programs fed through IBM equipment to digital analog equipment.
(F23, W23c, 18-74; ST)

110-F. Cored 90-Mm. Gun Tubes Extruded in 5 Min. Henry J. Decelle, Adam A. Krystofik and John Penrose. *Metalworking Production,* v. 102, Jan. 31, 1958, p. 190-193.

Pilot scale operations indicate that extrusion method produces tubes superior to forging with significant savings in time and material.
(F24, T2m; 4-60)

111-F.* Improvement of Castings by Press Forging. A. H. Murphy, L. L. Clark and W. Rostoker. *Modern Castings,* v. 33, Mar. 1958, p. 95-102.

Significant increases in the proof, yield and ultimate strengths of two cast high-strength Al alloys and one cast Mg alloy can be obtained by forging which produces 15-30% deformation. (F22; Al, Mg, 5)

112-F.* Press Forging Strengthens Light Metal Castings. W. Rostoker. *Modern Metals,* v. 14, Feb. 1958, p. 42-45.

Forging of light metal castings at just under peak aging or recrystallization temperature increases yield strength up to 84% in Al and 58% in Mg. (F22; Al, Mg, 5-61)

113-F. Induction Heating for Hot Forming. The "New Look" in Induction Methods for Forging and Extrusion Heating. Phillip W. Morse. *Steel Processing and Conversion,* v. 11, Feb. 1958, p. 95-101.

(F21b, 1-69, F22, F24)

114-F.* Press Forging of Ingot Uranium. John A. Fellows and H. J. Schaffer. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 67-71.

Practice employed in preparing ingots produced by thermit reaction between uranium tetrafluoride and magnesium for secondary rolling or extrusion. (F22, C26; U, 5-59)

115-F.* Rolling of Uranium. Gale S. Hanks, James M. Taub and Denton T. Doll. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 73-86.

Rolling schedules for reducing uranium plates and ingots to sheet of deep drawing quality. Hot rolling at 625° C. reduces ingot to intermediate thickness followed by warm rolling at 300° C. with and without intermediate anneal and with varying amounts of cross rolling to reduce sheet to final thickness. Relation of percent reduction and temperature of hot rolling to grain structure, ultimate strength, yield strength, elongation and hardness. Results of cup and mechanical tests indicate the variation of warm rolled sheet characteristics with rolling direction, percentage of reduction and method of annealing. 4 ref. (F23, Q-general; U, 4-53)

116-F.* Extrusion of Uranium. P. Loewenstein. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 87-94.

Phase transformation, oxidation, galling and other problems encountered in extrusion of uranium. Technique, die design, canning material, lubricants, extrusion constants, temperatures, speed, surface finish, microstructure and shapes of uranium-rich alloys extruded in the alpha phase or in the gamma phase. 7 ref. (F24; U)

117-F.* Cold Working of Uranium. James M. Taub, Denton T. Doll and Gale S. Hanks. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 95-106.

Uranium can be rolled, deep drawn, swaged and drawn into fine wire without difficulty at temperatures above the transition which exists between 100 and 150° C. Effect of percentage reduction and strain on grain size of cold rolled sheets following annealing. Effect of annealing atmosphere on mechanical properties: influence of impurities on cold working characteristics.
(F23, F25, G4, F28, 1-67; U)

118-F. (French.) **Latest Methods of Aluminum Extrusion.** Charles H. Wick. *Machine Moderne,* v. 52, Jan. 1958, p. 65-68.

(To be continued.) (F24, W24g)

119-F. (German.) **Net Frequency Induction Equipment for Hot Forming.** A. Finzi. *Deutsche Elektrotechnik,* v. 11, Aug. 1957, p. 337-380.

Preheating of Al, Ag alloy, bronze and Cu. (F21b, W28s; Al, Ag, Cu)

120-F. (German.) **New Knowledge Gained Through the Drawing Cut of Plate-Shearing Machines.** Alfred Wutherich. *Werkstatt und Betrieb,* v. 90, Aug. 1957, p. 490-492.

Examination of cutting conditions of plate shearing machines having oblique top cutter. (F29q, W24m)

121-F. (Japanese.) **Metal Flow in Oblique Rolling.** Shinsaku Mise, Toyohiko Okamoto and Akira Funatch. *Sumitomo Metals,* v. 9, July 1957, p. 143-157.

Displacement and deformation of materials when a solid round billet is pierced in a piercing mill to form a hollow cylinder. (F26q)

122-F.* **Closing of Internal Cavities in Forgings by Upsetting.** A. Tomlinson and J. D. Stringer. *Iron and Steel Institute, Journal* v. 188, Mar. 1958, p. 209-217.

Experiments with newly developed upsetting tools; conditions and mechanism of the closure of the holes; mechanical properties of healed holes; practical application of results. (F22j)

123-F.* **Theory of Extrusion.** J. F. W. Bishop. *Metallurgical Reviews,* v. 2, 1957, p. 361-390.

Extrusion mechanics, stress, slip lines, plane-strain extrusion, dead metal regions, residual stresses, preferred orientations, anisotropy, temperatures, practical applications. 29 ref. (F24; 10-51)

124-F. **Rolling of Uranium (Sheet).** T. L. Crisler, J. D. Duncan, D. S. Fisher, G. S. Hawks and V. Vigil. *U. S. Atomic Energy Commission,* LA-2071, Dec. 1957, 217 p.

12 ref. (F22, 4-53; U)

125-F.* **Giant Press Presents New Potentials for Magnesium Extrusions.** K. F. Braeuninger. Paper from "Magnesium in Perspective", Magnesium Association, p. 701-707.

New 13,200-ton extrusion press is capable of extrusion ratios up to 100-to-1. A wide variety of shapes previously either impossible or extremely difficult to extrude are now practical. (F24, 1-52; Mg)

126-F. (German.) **Design and Operation of a Modern Continuous Mill Train Rolling Medium Strip.** Herbert Severing. *Stahl und Eisen,* v. 78, Feb. 20, 1958, p. 205-214.

(F23, 1-61, W23c)

127-F. (Japanese.) **Extrusion Pressure and Properties of Extruded Rods of Pure Aluminum and Its Alloys.** Yoshikazu Hosoi and Mamoru Yukawa. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 39-42.

5 ref. (F24, J23, M27, Q23a; Al)

128-F. **Punch Cards Program Rolling Mill.** *Iron Age,* v. 181, Feb. 20, 1958, p. 92-93.

(F23, W23c, X14; ST)

129-F. **Titanium Extrusions Cut Production Costs.** N. J. Feola. *Iron Age,* v. 181, Mar. 27, 1958, p. 96-98.

(F24, 17-53; Ti-b)

130-F.* **Extrusion Press Tooling Pt. 2. Structural Streaking.** Richard Baugh and John Lyons. *Light Metal Age,* v. 16, Feb. 1958, p. 27-29.

Types and causes and remedies for structural streaking in Al extrusions. (F24, 9-71; Al)

131-F. (English.) **Manufacture of Large High-Pressure Hollow Bodies.** *Aciers Fins et Speciaux Francais,* no. 27, Dec. 1957, p. 82-86.

Method of production, advantages and limitations of one-piece steel forgings to be used for high-pressure containers. (F22, T26q, 4-51; ST)

132-F.* (Czech.) **Influence of Metallurgical Factors on Billet Quality and Yield in the Rolling of Seamless Tubes.** Vilém Friedrich. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1077–1083.

Plant scale tests in rolling seamless tubes from billets and round ingots show principal factors determining quality and yield of tubes are the kind and quality of steel. Yields after rolling tubes under different production conditions from melt of openhearth and basic bessemer steel. Other fabricating factors influencing yields. (F26s; ST-e, ST-g)

133-F.* (Czech.) **A Planetary Rolling Mill.** Anatol Velsovsky. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1083-1087.

Mathematically analyzes working processes in Sendzimir planetary rolling mill and calculates forces which exert influence on the backup roll. Theoretically no force is transmitted to pressure screws of the mill since the weight of the backup roll assembly is sufficient to balance the force of the resistance against deformation of the material. (F23, W23, 1-52)

134-F.* (Polish.) **Establishment of the Optimum Procedure for Subdivision of 8.5-Ton Ingot and Classification of Slabs for Sheet Steel Deep Drawing.** Waclaw Leskiewicz, Ryszard O'Donnel, Stanislaw Spiewak and Eugeniusz Wosiek. *Hutnik*, v. 24, Dec. 1957, p. 477-488.

General characteristics of deep-drawn steel sheet. Principles of ingot subdivision and slab classification. Investigation of low-carbon rimmed steel ingots and tabulation of results of mechanical working. 7 ref. (F23, G4b; ST-d, 5-59)

135-F. (Russian.) **Selection of Method of Heating Billets in Forging and Stamping Plants.** V. N. Glushkov. *Vestnik Mashinostroeniya*, v. 38, Jan. 1958, p. 56-62.

10 ref. (F21b, F22, G3)

136-F. Stainless Steel Processing Requires Special Rolling and Annealing Techniques. *Industrial Heating*, v. 25, Mar. 1958, p. 472-474.

Economy of operation demands that the greatest amount of reduction be accomplished per pass. Annealing between passes results in preferred grain orientation and recrystallization, enabling subsequent reductions. (F23c, J23; SS, 4-53)

137-F. Induction Heating Facilitates Axle Production. *Industrial Heating*, v. 25, Apr. 1958, p. 720-724.

(F22, J2g, T21c)

138-F. Production and Assembly of Strips for Mikrokator Movements. *Machinery (London)*, v. 92, Mar. 28, 1958, p. 713-716.

(F23; Cu-s, 4-53)

139-F. (German.) **Smooth Rolling.** H. König. *Technische Mitteilungen*, v. 50, Jan. 1957, p. 41-42.

(F23q)

140-F. Cold Rolling of Main Propulsion Shafting. *Bureau of Ships Journal*, v. 6, Feb. 1958, p. 20.

Procedure for increasing fatigue resistance of forged steel (MIL-S-890) used for propulsion shafting. (F23, 1-67, Q7a, T7j; ST)

141-F. Practical Slide Rule Method for Calculating Percentage Reduction in Area in Working and Testing of Rod and Wire. A. F. Mohrnheim. *Wire and Wire Products*, v. 32, Dec. 1957, p. 1495-1497, 1522-1524.

Simple method for rapidly determining the minimum number of passes, sequence of die sizes and other mathematical wire mill problems. (F28, X14h)

142-F. Temperature of Distribution in an Ingot During Heating in Regenerative Soaking Pits. E. I. Kazantsev and M. N. Strelets. *Stal'*, no. 4, 1957, p. 358-361. (Iron and Steel Institute, Translation no. 533.)

Previously abstracted from original. See item 170-F, 1957. (F21b; ST-d, 5-59)

143-F. Modernization of Units of Slabbing Mill Equipment. B. M. Tsirlin. *Stal'*, no. 3, 1957, p. 232-238. (Iron and Steel Institute, Translation no. 546.)

Previously abstracted from original. See item 151-F, 1957. (F23n, W23a, 1-52)

144-F. Effect of Furnace Atmosphere on Scaling of Billets. Jean Moreau. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques*, v. 13, 1956, p. 1973-1982. (Iron and Steel Institute, Translation no. 600.)

Previously abstracted from original. See item 1-F, 1957. (F21; ST)

145-F. Rationlization of Rail Pass Design. A. M. Karpunin. *Stal'*, no. 6, June 1957, p. 536-540. (Iron and Steel Institute, Translation no. 625.)

Previously abstracted from original. See item 174-F, 1957. (F23; ST, 4-57, 17-51)

146-F. Machines for Processing Medium and Heavy Plates. Friedrich Wilhelm Zurcher. *Stahl und Eisen*, v. 75, Sept. 8, 1955, p. 1182-1188. (Iron and Steel Institute, Translation no. 668.)

Previously abstracted from original. See item 246-F, 1955. (F29, G1, ST)

147-F. Cold Rollability of Transformer Steels Containing More Than 3.3% Silicon. Franz Lihl and Paul Zemsch. *Archiv für das Eisenhüttenwesen*, v. 27, Oct. 1955, p. 599-602. (Iron and Steel Institute, Translation no. 987.)

Previously abstracted from original. See item 261-F, 1955. (F23, Q23q; AY)

148-F. (French.) **Cold Rolled Steel Extrusion.** Ben Kaul. *Machine Moderne*, v. 12, Mar. 1958, p. 9-16.

"Koldflo" method. (F24; ST)

149-F. (French.) **Latest Techniques in Extrusion of Aluminum.** Charles H. Wick. *Machine Moderne*, v. 32, Mar. 1958, p. 37-40.

(F24, W24g, Al)

150-F. (Russian.) **Continuous Tube Welding Machines.** Yu. A. Mednikov.

Metallurg, Jan. 1958, p. 32-34.
(F26p, 1-2)

151-F. (Russian.) **Cold Drawing Thin Wire.** I. S. Pobedin, V. I. Bairakov, M. G. Uglov and V. G. Drozd. *Metallurg,* Feb. 1958, p. 32-34.
(F28)

152-F. Extra Forging Steps Yield Special Benefits. Herbert Chase. *Iron Age,* v. 181, May 1, 1958, p. 81-83.

Although additional forging operations increase initial costs, less machining is required in later stages, reducing over-all expense. (F22)

153-F.* Turn-Up and Turn-Down in Hot Rolling. G. E. Kennedy and F. Slamar. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 71-79.

Investigation of curvature indicates that it is more closely related to relative roll speeds than torque. Factors such as angle of entry and amount of edge working are much less significant. (F23, 1-66, 3-67)

154-F. Production of Seamless Casing and Tubing. Melvin Sumrall. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 138-139.

Steps in producing tubing from round billets, involving heating, centering, piercing, reeling and either sizing to produce casings or stretch reducing to produce tubing.
(F26q, W23h)

155-F. Installation of Stretch Reducing Mill. Howard L. Mitchell. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 139-141.
(F26q, W23h)

156-F. Double Cooling Bed for Rod Mill. D. H. Driscoll and Clair Renberg. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 141-143.
(F23, W23d)

157-F. Quantity Production of Nails. *Machinery (London),* v. 92, Mar. 1958, p. 667-671.

Principal features of Ransohoff nail cleaning plant installed at Castle Works, Cardiff, England; processes involved in nail manufacture, before and after cleaning cycle. (F27, T7f; ST)

158-F. Welded Tubing at High Speeds. *Modern Industrial Press,* v. 20, Apr. 1958, p. 23-24.

Buick steps up production of exhaust pipes with new tube mill and improved bending and forming methods.
(F26p, W23h, T21b; 4-60, ST)

159-F.* The Working of Molybdenum and Its Alloys. W. L. Bruckart. Paper from "The Metal Molybdenum", American Society for Metals, p. 109-142.

Primary working of arc-cast molybdenum—preparation of ingots, extrusion procedures, rolling; limits for section size of Mo bar, plate, strip and sheet; forging; current practices in the primary working of powder metallurgy Mo; fabrication processes including sawing, shearing, slitting, punching, binding, deep drawing and machining, heat treatment and stress relieving.
(F-general, G-general; Mo)

160-F.* Fabrication at Very High Temperature Under a Controlled Atmosphere. J. D. Nisbet. Paper from "The Metal Molybdenum", American Society for Metals, p. 143-150.

Feasibility of hot working of Mo has been demonstrated by encasing a forging hammer in an appropriate enclosure filled with argon, with induction-heating facilities built in. Samples of Mo-Cb alloy declared unforgeable at steel working temperatures were readily forged. 4 ref.
(F22; Mo)

161-F.* Forging of Molybdenum Alloy Turbine Blades. J. J. Russ and G. E. Schrader. Paper from "The Metal Molybdenum", American Society for Metals, p. 511-518.

Results indicated that precision turbine blades can be successfully forged from the 0.5% Ti-Mo alloy. To insure adequate strength properties for turbojet engine operation, at least 70 to 80% deformation must be performed below the recrystallization temperature. With properly processed forging stock and adequate controls of heating times and forging temperatures, blades with sufficient strength and resistance to recrystallization in service can be produced. 6 ref.
(F22, T7h, 17-57; Mo-b)

162-F. Phosphate and Waterglass Coating of Wire for Drawing. I. M. Goncharov. *Stal',* v. 17, no. 5, 1957, p. 464-465. (Henry Brutcher, Altadena, Calif., Translation no. 4076.)
(F28; NM-h)

163-F. (French.) **Recent Progress of Rolling Mills in the Metallurgy of Iron.** *Publications de l'Institut de Recherches de la Sidérurgie,* Series B, no. 34, Oct. 1957.

Modern practices in hot and cold rolling, blooming and slabbing; roll-

ing mill types used in France, Italy and the United States.
(F23, W23; ST)

164-F. (German.) **Examination of Rolling Oils and Oil Emulsions by the Cold Rolling Test. Pt. 2. Rolling Tests With Commercial Rolling Oils Under Different Conditions of Operation Adapted to Practice.** Werner Lueg and Paul Funke, Jr. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 333-343.

14 ref. (F23; NM-h)

165-F. (German.) **Characteristics and Behavior in Service of Novel Rolling Oil Emulsions.** Joseph Billigmann and Walter Fichtl. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 344-357.

25 ref. (F23; NM-h)

166-F. (German.) **Effect of Rolling Conditions on Properties of Hot Rolled Low-Carbon Steel Strip. Pt. 1. Structure of the Scale and Behavior in Pickling.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 368-377.

11 ref. (F23, L12g; CN-g, 4-53)

167-F. (Russian.) **Piercing of Tube Billets With Water Cooled Mandrels.** M. M. Kaufman. *Stal',* Feb. 1958, p. 144-151.

(F26g, W23h)

168-F. (Russian.) **Prevention of Sticking of Low-Carbon Steel Sheet by Addition of Chromium.** G. M. Katsnel'son and M. W. Kravets. *Stal',* Feb. 1958, p. 156-158.

Reduction of sticking after hot rolling. (F23, 1-66; CN-g, *Cr,* 4-53)

169-F. Mechanical Scarfing. Irwin H. Such. *International Acetylene Association, Official Proceedings,* 1956, p. 116-125.

Method for conditioning surface of steel with oxy-acetylene flames and scarfing oxygen jets before it is rolled into forms for fabrication.
(F21e; W20j)

170-F. New Tube-Drawing Ideas Boost Mill Capacity. R. H. Eshelman. *Iron Age,* v. 181, May 15, 1958, p. 75-77.

(F26r; 18-67)

171-F. Aluminum Plate Production. New Ancillary Equipment in Operation at Rogerstone. *Metallurgia,* v. 57, Apr. 1958, p. 175-180.

Northern Aluminium Co. Ltd., Rogerstone, Monmonthshire.
(F23, W23b; Al, 4-53)

172-F. Photo-Elastic Stress Analysis. W. Shelson. *Ontario Hydro Research News,* v. 9, July-Sept. 1957, p. 11-14.

(F2, G25)

173-F. Pellet Extrusions Beef Up Magnesium Structures. G. S. Foerster and H. A. Johnson. *Product Engineering, Design Edition,* v. 29, May 12, 1958, p. 80-81.

Molten Mg is sprayed through an orifice onto a spinning disk in an atmosphere of natural gas. Centrifugal force disperses the metal into small droplets. These solidify and are blown to a screening station where oversize pellets are removed. To extrude the pelletized material, they are blown through pipes into the chamber of an ordinary extrusion press from which they are extruded through a die that gives the desired shape.
(F24, H10f, Q-general; Mg-b)

174-F. New Extrusion—Fabrication Process Reduces Jet Engine Parts Costs. Neil J. Feola. *SAE Journal,* v. 66, Feb. 1958, p. 32-35.

(F24; T24b; Ti-b)

175-F. Induction Heating of Titanium Alloys for Hot Working. V. A. Yakovlev and Ya. I. Spektor. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 43-46. (Henry Brutcher, Altadena, Calif., Translation no. 4124.)

(F21b, J2g; Ti)

176-F. Grain Growth and Surface Decarburization in Induction Heating of Steel Billets. Ya. I. Karker and M. G. Kogan. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 46-49. (Henry Brutcher, Altadena, Calif., Translation no. 4125.)

(F21b, J2g, N3; CN, AY, 5-59)

177-F. Automation of a 12-Roll Reversing Cold Rolling Mill. Herbert Schamale. *Stahl und Eisen,* v. 76, Dec. 13, 1956, p. 1698-1700. (Iron and Steel Institute Translation no. 641.)

Previously abstracted from original. See item 50-F, 1957.
(F23, 1-67, S14, 18-74; ST)

178-F. How to Determine Forging and Finishing Periods. Hans Haller. *Werstatt und Betrieb,* v. 90, Apr. 1957, p. 227-232. (Iron and Steel Institute Translation no. 874.)

Previously abstracted from original. See item 128-F, 1957.
(F22, 3-67)

180-F. (German.) **Time Studies on Rolling Mill Trains.** Kurt Lehmann.

Stahl und Eisen, v. 78, Apr. 17, 1958, p. 505-509.

(F23, A5d; 4-52, ST)

181-F. (Russian.) **Rolling in Accordance With Theoretical Weight at the Petrovsk Works.** I. I. Entin and N. I. Beda. *Stal'*, Jan. 1958, p. 55-57.

(F23, W23b)

182-F.* (Russian.) **Determination of Spreading in Rolling.** M. V. Shuralev and S. G. Nekrasov. *Stal'*, Jan. 1958, p. 57-60.

A relatively simple formula permits the determination of spreading which takes place while rolling stock. Certain experimental correction factors are applied for various conditions. 6 ref. (F23)

183-F.* (Russian.) **Production of Hot Rolled Tubes From Steel No. EI595 and Their Properties.** N. S. Alferova, G. P. Pishchikov and V. P. Konovalov. *Stal'*, Jan. 1958, p. 60-66.

This steel shows pronounced tendency to brittleness under cold working. Investigation of the effect of heat treatment on the tendency toward brittleness and rupture showed that heating to 950° C., followed by quick quenching, lowers the critical temperature of transition. Rolling at lower temperature results in fine grain structure and reduced sensitivity to brittleness. 4 ref. (F26s, Q26s; ST)

184-F.* (Russian.) **Weldability of Cracks in Alloy Steels by Rolling.** I. N. Golikov and B. M. Litvinov. *Stal'*, Jan. 1958, p. 66-70.

Longitudinal cracks are easily welded by small amount of deformation of 2-3 extension coefficient. Transverse cracks lengthen as rolling proceeds, their walls touch and finally become welded together. Cracks up to 25 mm. in a square bar of 125-140 mm. become welded while the bar is reduced to 40 x 40 mm. 6 ref. (F23, 9-72; AY)

185-F. (Spanish.) **Steel Industry and Modern Methods in Steel and Tin Plate Production.** Reynaldo Vega. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 189-205.

Steel industry in Mexico; processes and methods in pickling using H_2SO_4; reduction in reversing mills; cleaning, annealing, quenching, cold tinning and cutting of steel sheet. (F23, J-general, L-general; ST, *Sn*, 4-53)

186-F. (Spanish.) **Innocenti Calmes Process of Seamless Pipe Production.** Jorge Gomez Llerenas. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 275-279.

Production of 6-in. line pipe at Tamsa Plant, Mexico. Micrographs of cross sections made during drawing operations. (F26r, M27; ST)

187-F. (Spanish.) **Processes for Fabrication of Seamless Steel Pipe.** Ugo Keller. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 281-287.

(F26; ST)

188-F. (Spanish.) **Seamless Steel Pipe in Latin America.** Francisco Indaco. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 289-295.

(F26; ST)

189-F. Manufacture of Copper Wire. H. D. Feldmann. *Draht, English Edition*, no. 34, Apr. 1958, p. 19-22.

Work hardening and annealing, pickling, washing and welding, reductions and defects. (F28; 4-61, Cu)

190-F. Large Drop Hammer Makes Better Parts. George H. DeGroat. *American Machinist*, v. 102, June 2, 1958, p. 98-99.

(F22n, W22q)

191-F.* Forging Alloys for Gas Turbine Discs and Blades. *Aciers Fins & Speciaux*, no. 28, Mar. 1958, p. 22-25.

Alloys used are always high in Ni and have variable amounts of Cr, Co, Mo, W, Ti and Al. They are austenitic and are generally capable of structural hardening. Cold strength frequently exceeds 100 kg. per sq. mm. (F22, Q27, T7h; SGA-h)

192-F. Designing, Fabricating Pressure Piping. J. J. Murphy, C. R. Soderberg, Jr., H. S. Blumberg and D. B. Rossheim. *Heating Piping and Air Conditioning*, v. 30, Jan. 1958, p. 160-164.

Current pressure equipment practices and analysis of the interrelation of materials, design, fabrication, and inspection with safety, economics, and service. (F26p; 17-51)

193-F. Manufacturing Facilities for Massive Plate. *Light Metals*, v. 21, May 1958, p. 144-147.

(F24, F23, 1-52; Al-b, 4-53)

194-F. Application of Phosphate Coatings to the Multiple Cold Drawing of Tubes. M. S. Goncharevsky. *Stal'*, Mar. 1957, p. 243-253. (Iron and Steel Institute Translation no. 617.)

Previously abstracted from original. See item 152-F, 1957. (F26r, 1-7; NM-h)

195-F. Experiences in the Rolling and Rerolling of Wide Strip in Multiple-Stand Cold Rolling Mills. Vincenz Seul and Joseph Billigmann. *Stahl und Eisen*, v. 76, Feb. 10, 1955, p. 144-162. (Iron and Steel Institute Translation no. 659.)

Previously abstracted from original. See item 71-F, 1955. (F23, 1-67; CN, 4-53)

196-F. Investigations on a 4-High Reversing Mill Stand Rolling Cold Strip for Tinplate. Pt. 1. Measurements to Determine the Power and Work Required and the Degree of Utilization. Pt. 2. Effect of Rolling Force, Rolling Speed, Strip Tension, and Amount of Lubrication Used on the Trueness to Dimensions of Cold Rolled Strip. Karl Heinz Spiller. *Stahl und Eisen*, v. 77, June 27, 1957, p. 867-881. (Iron and Steel Institute Translation no. 660.)

Previously abstracted from original. See item 126-F, 1957. (F23, W23c, 1-52; ST)

197-F.* (German.) **On the Hydrodynamic Theory of the Hot Rolling Process.** Alfred Kneschke. *Archiv für das Eisenhüttenwesen*, v. 28, Jan. 1958, p. 11-21.

Hydrodynamic theory of hot rolling developed mathematically. Functional dependence of mechanical values on the values of the rolling parameters such as surface speed of rolls, thickness of material, reduction rate, radius of roll, yield stress and dynamic ductility of the rolled material is analyzed; practical data on pressure in the rolling gap, the state of movement and deformation resistance were verified mathematically and explained. 24 ref. (F23, 1-66; ST; 10-51)

198-F. (Russian.) **Investigation of Rolling Pressures in Plate Mills.** Z. F. Tsukanov, F. K. Ivanchenko, L. F. Molotkov, B. A. Pavlenko, V. A. Kikolaev, A. L. Krizhanovskii and P. Ya. Kokhno. *Stal'*, v. 18, Apr. 1958, p. 332-334.

Measurement of rolling loads sustained by rollers in medium plate mill makes possible precise calculation of necessary pressure and results in considerable increase in productivity. (F23, W23b, 3-74, 4-53)

199-F. Induction Heating of Cast Steel Ingots. Michael C. D. Hobbs. *Instrumentation*, v. 11, Mar-Apr. 1958, p. 20-21.
(F21b, W28s; ST, 5-59)

200-F. Institute of Metals Jubilee Meeting. Works Visits: Northern Aluminium Co., Ltd., Banbury. *Metal Industry*, v. 92, May 16, 1958, p. 405-406, 408.
(F24; 18-67, Al-b)

201-F. Stainless Forging Takes Precise Control. *Steel*, v. 142, June 9, 1958, p. 92-94.
(F22m; SS)

202-F. (French.) **Fabrication and Uses of Large Extrusion in Aluminum and Light Alloys.** Michel Costeraste and Pierre Bandet. *Revue de l'Aluminium*, v. 35, Apr. 1958, p. 427-437.
(To be continued.) (F24; Al-b)

203-F. (Italian.) **Machining of Metals by Means of Hot Plastic Deformation. Pt. 10. Drop Forges.** Romeo Giusfredi. *Rivista di Meccanica*, v. 9, Mar. 15, 1958, p. 9-14.
(To be continued.) (F22n)

204-F. (Russian.) **Reduction of Waste Ends of Billets in Tubemaking.** S. I. Orlov. *Stal'*, v. 18, Apr. 1958, p. 335-339.

By proper alignment of tube billets end irregularities were considerably reduced. Use of new lengthened-type mandrel improves performance of piercing mill and reduces number of tubes rejected due to inner flaws. (F26)

205-F.* **The Calculation of Drawing Force and Die Pressure in Wire Drawing.** P. W. Whitton. *Institute of Metals, Journal*, v. 86, May 1958, p. 417-421.

An expression has been obtained in terms of the drawing variables which permits the prediction of drawing load and die pressure. Accuracy is within ± 10% over the wiredrawing range, which halves the errors given by previous methods. Theories which assume homogeneous - deformation conditions, while extremely accurate at the very low angles, are not suitable generally. 14 ref. (F28)

206-F. Extruding Titanium. *Metal Industry*, v. 92, May 30, 1958, p. 445-446.
(F24; Ti-b)

207-F. Aluminum Sheathing of Flat Uranium Plates by Extrusion Cladding. A. J. Mooradian. Paper

from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 120-141.

Process consists in using the U flat as a moving mandrel over which the sheath is extruded directly, thereby completely encasing the U with Al as it passes through the die. Both Ni plated and bare U flat elements sheathed in Al by the extrusion cladding method have been successfully tested under irradiation. (F21g, T11g; U, *Al*, 2-67)

208-F. Coextrusion Applied to the Fabrication of Solid or Disperse Fuel Elements. R. Montagne and L. Meny. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 142-156.

Since the usual cladding methods were unsuccessful the bond was obtained by a process called "co-extrusion". It consists of simultaneously extruding the fuel and its cladding. (F24, T11g; U, *Zr*, 8-59)

209-F. Zirconium Cladding of Uranium and Uranium Alloys by Coextrusion. A. R. Kaufmann, J. L. Klein, P. Loewenstein and H. F. Sawyer. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 157-181.

Fabrication of Zr-clad uranium fuel elements having integral Zr end seals. (F21g, T11g; U, *Zr*)

210-F. Preparation and Sheathing of Plutonium-Aluminum Fuel Alloys for the NRX Reactor. O. J. C. Runnalls and K. L. Wauchope. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 778-788.
(F21g, T11g; U, Al, Pu, 8-59)

211-F. Classical Heat Flow Problems Applied to Induction Billet Heating. R. M. Baker. *Applications and Industry*, no. 36, May 1958, p. 106-112. 5 ref. (F21b, I-69, P11k)

212-F. Developments in Rod and Bar Rolling Progress During Post-War Period. R. Stewartson. *Iron and Coal Trades Review*, v. 176, Apr. 25, 1958, p. 992-993.
(F23, W23d; ST)

213-F.* Extrusion Through Single-Hole Staggered and Unequal Multi-Hole Dies. W. Johnson, P. B. Mellor and D. M. Woo. *Mechanics and Physics of Solids, Journal*, v. 6, May 1958, p. 203-222.

Calculations for the pressure for extrusion through perfectly smooth and rough wedge-shaped dies of small unequal angles; effects on the pressure and obliquity of the emergent sheet of inclining the die orifice to the direction of the punch travel. 20 ref. (F24, 3-74)

214-F. The Forging of Heat-Resisting Metals. A. H. Waine and J. R. Rait. *Metal Treatment and Drop Forging*, v. 25, May 1958, p. 191-196. 17 ref. (F22; SGA-h)

215-F. (Czech.) **Geleji Formula for the Determination of Average Specific Pressure on Hot Rolling.** Ladislav Hellebrand. *Hutnicke Listy*, v. 13, no. 4, 1958, p. 313-315.

Proposes revision of Geleji formula which gives results more nearly in accordance with real values of average specific pressure on hot rolling. 5 ref. (F23, 1-66, 10-51)

216-F.* (Russian.) **Calculation of Pressure Produced by Metal on Rolls.** Yu. M. Chizhikov. *Stal'*, v. 18, May 1958, p. 428-433.

Calculation of average pressure on rolls of blooming and sheet rolling mills by means of formulas; comparison with experimental data. Concluded that existing analytical methods for determining deformation resistance in rolling cannot give accurate results. 11 ref.
(F23, 4-52, 4-53, 10-51)

217-F.* (Russian.) **Present State of Theory of Pressure Produced by Metal on Rolls in Longitudinal Rolling.** A. I. Tselikov. *Stal'*, v. 18, May 1958, p. 434-441.

Dependence of metal pressure on rolls upon external zones and deformation speed. Possible ways to improve author's formula as to effect of external friction, width of strip and deformation resistance. Adjustment of formula to actual conditions. 36 ref. (F23, 10-51)

218-F.* (Russian.) **Manufacture of Alloy Steel Piping for High and Super-High-Pressure Boilers.** S. I. Borisov. *Stal'*, v. 18, May 1958, p. 442-446.

Technology of rolling and heat treatment developed by laboratory and industrial experiments. Composition of experimental steels. Manufacture of pipes 219-273 mm. in diameter, and pipes less than 60 mm. in diameter. (F26s; AY)

219-F.* (Russian.) **Manufacture of Seamless Pipes From Cast Shells Produced by Vacuum Crystallization Method.** Ya. B. Gurevich and V. E.

Naimark. *Stal',* v. 18, May 1958, p. 446-448.

Use of process for hard-to-work steels. Experiments on 25-20 Cr-Ni steel. Technology of rolling and heat treatment. Experiments on steels with 19-23% Cr and 23-28% Ni by cold rolling. (Vacuum crystallization method was patented by V. E. Naimark and B. P. Nesterenko in 1940). 7 ref.
(F26q, F26s; SS)

220-F. Indentation and Forging and the Action of Nasmyth's Anvil. W. Johnson. *Engineer,* v. 205, Mar. 7, 1958, p. 348-350.

Pressure required to indent a block of metal by three or more dies of equal width when symmetrically situated; the solution proposed is formally identical with extrusion through a smooth wedge-shaped die. 6 ref. (F22, W24n, 1-52)

221-F. Mill and Laboratory Evaluation of Oils for Rolling of Copper Alloys. F. L. Reynolds. *Lubrication Engineering,* v. 14, Mar. 1958, p. 98-103, 120.

Lubrication of strip during rolling; staining tendency during anneal; separation in recovery operation. (F23; NM-h, Cu)

222-F. Forging Practice as Related to Quality of Steel Used in Rotors for Steam Turbines and Turbogenerators. N. V. Tikhomirov. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 39-43. (Henry Brutcher, Altadena, Calif., Translation no. 4186.)

Defects in steam turbine and turbogenerator rotor forgings are associated with the metallurgy of the ingots and the forging and heat treatment. (F22, W11k, 17-57; ST)

223-F. (German.) **Extrusion of Copper-Chromium and Copper-Zinc-Chromium-Alloys.** Nurettin Cuhadar. *Istanbul Teknik Universitesi Bulteni,* v. 10, no. 3, 1957, p. 1-6.
5 ref. (F24; Cu-b, Cr-b, Zn-b)

224-F. (Russian.) **Relation Between Metal Pressure and Deformation Rate in Rolling.** M. Ya. Brovman and R. M. Shpigelman. *Stal',* v. 18, Mar. 1958, p. 230-235.

Deformation rate has a considerable effect on the metal pressure in rolling. Formulas for determining this effect agree with the experimental data so far available but it is advisable to obtain a further check of their accuracy. 4 ref. (F23, 3-74)

225-F. (Russian.) **Force Distribution in the Cold Rolling of Tubes.** F. Shevakin. *Stal',* v. 18, Mar. 1958, p. 235-240.

Investigation of the effect of basic factors on the force distribution in the cold rolling process revealed several possibilities for increasing rolling mill output. (F26s)

226-F.* (German.) **Resistance of Lead and Lead Alloys to Upsetting.** Erich Pelzel. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 236-239.

Resistance to upsetting of lead with additions of Cu, Zn, Sb, Bi, Sn, Cd, Li, Te and Ag at various temperatures and their various effects. (F22j, 17-52; Pb, 2-60)

227-F.* Some Practical Solutions to Hot Mill Problems. R. A. Smith and A. D. Patton. *Iron and Steel Engineer,* v. 35, July 1958, p. 92-96.

How following problems were handled in 96-in. hot mill of Pittsburgh Works, Jones and Laughlin Steel Corp.: increasing heating furnace capacity, skid pipe breakage, quenching of heavy-gage coiled plate for line pipe, increasing roll life, crowning of rolls to provide product suitable for both hot and cold rolled processing and tin plate and galvanizing departments. (F23, W23c)

228-F.* Lubrication Problems in Fabrication of Nuclear Reactor Metals. Paul Lowenstein. *Lubrication Engineering,* v. 14, June 1958, p. 262-265, 273.

Hot extrusion and tube drawing of U, Th, Be and Zr. 4 ref.
(F24, F26; U, Th, Be, Zr)

229-F.* (French.) **New Method of Rolling Thin-Section Joists.** H. Sedlaczek. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 333-338.

Rolling of joists on traditional mill lines becomes increasingly difficult as webs become thinner and wider, since cooling of metal and forming of flanges present serious problems. Method permits transverse cutting of flanges in original section and utilizes Rendleman method, which facilitates rapid reduction of web thickness by means of a toothed roll. (F23q)

230-F. The Production of Titanium With Particular Reference to Sheet and Rod Processing. *Sheet Metal Industries,* v. 35, July 1958, p. 535-542.

At the Waunarlwydd (South Wales) Works of I.C.I. Ltd., Metals Division. (F-general; Ti-b)

231-F. Hot Precision Forgings and Extrusions. John F. Murphy. *Society of Automotive Engineers, Preprint*, 36C, Mar-Apr. 1958, 18 p.

(F24, G5)

232-F. Automatic Devices Key to Flexibility for Extrusion, Melting Furnace Output. *Western Metalworking*, v. 16, Mar. 1958, p. 50-52.

Modern equipment and automatic material handling devices in brass rod mill make it possible to start an order minutes after receiving it. (F22n, F24a, W12, 18-74; Al, Cu-n)

233-F. BISRA Annual Report for 1957. *Wire Industry*, v. 25, June 1958, p. 571, 573.

Progress in wire-drawing and rod rolling reviewed in the Annual Report of the British Iron and Steel Institute Research Association. (F28, F27)

234-F. (Swedish.) **Wire Drawing. A Survey of Current Literature.** E. Lindstrand. *Jernkontorets Annaler*, v. 142, no. 3, 1958, p. 105-127.

146 ref. (F28)

235-F.* (Swedish.) **Experimental Investigations in Wire Drawing.** Carl Olof von Hofsten and Erik Lindstrand. *Jernkontorets Annaler*, v. 142, no. 3, 1958, p. 128-164.

Experiments on wire drawing machine having speed range of 90 to 1000 ft. per min. deal with influence of different coating on drawing force and temperature. Considers optimum die angle and properties of a rotating die. Temperature measurements found to be well suited for classifying coatings. In drawing annealed carbon steel wire lowest temperature at all speeds and reductions were obtained by using sullcoat in combination with borax. Lowest values of temperature and drawing force obtained with die angles of 14°. Die rotation had no influence on drawing force. (F28, 2-61)

236-F.* Precision Hollow Forgings in Nonferrous Alloys. H. D. Challen. *Metal Treatment and Drop Forging*, v. 25, July 1958, p. 269-274.

Methods of forging developed for use on beta brasses combining stamping and extruding, producing forgings with cores on one axis, and with several cores on different axes. Advantages and limitations of the process. (F22m; EG-a38)

237-F.* Cold Rolling Very Thin Strip. *Australasian Manufacturer*, v. 43, June 21, 1958, p. 44-49.

Methods enable an ordinary two-high rolling mill used in conjunction with a simple insert mill to roll nickel-iron tapes up to 1 in. wide to thicknesses of the order of 0.0001 in. (F23q, 1-52; Ni, Fe)

238-F.* (French.) **Increase in Free Width in the Hot and Cold Rolling of Copper and Brass With Noncalibrated Rollers.** R. Miculescu, S. Bercu and I. Dragan. *Revue de Métallurgie (Bucarest)*, v. 1, 1956, p. 107-112.

On the basis of a series of tests in which all the parameters of interest were taken into account, formulas and nomographs were developed enabling the calculation of the increase in width in the hot and cold rolling of Cu and brass. (F23; Cu, Cu-n)

239-F.* (Russian.) **Increased Efficiency in Rolling With Application of Minus Tolerances.** B. B. Rozin and R. S. Geifman. *Stal'*, Jan. 1958, p. 51-55.

Based upon research carried out in high-grade steel plants a method was evolved for calculating the theoretical weight of bar stock. This method is simpler and more accurate than those which are now used. Application of the formula for different conditions. (F23; ST)

240-F.* (German.) **Method of Determining Power and Work Requirements in Drop Forging.** K. Lange. *Industrie-Anzeiger*, v. 80, June 3, 1958, p. 631-634.

Forces and work involved in hot forming depend on the magnitude of the forming operation, dimensions of the work and resistance to deformation. Resistance to deformation, in turn, depends on the type of material and varies with temperature and speed of deformation; it is also affected by frictional factors and shape. Methods of determining the various influencing factors. Diagrams covering a range of drop forging shapes determine the power and work requirements. 8 ref. (F22n)

241-F. Kaiser Starts Rolling Mills at Ravenswood. *Iron and Steel Engineer*, v. 35, July 1958, p. 137-140.

Fully integrated highly automated Al production and fabrication center in West Virginia will have annual production capacity of 170,000 tons of rolled products. (F23, 1-52; ST)

242-F. Hot-Pressing With H. F. Induction Heating. R. Schiesser.

Metalworking Production, June 27, 1958, p. 1123-1126.

In hot pressing or forging, the blanks are brought to a temperature exceeding the re-crystallization point of the material (steel, brass, light metal alloys). Operation and utilization of Brown Boveri high-frequency generator.
(F21b, F22, 1-69)

243-F. Three New Forging and Extrusion Methods. John F. Murphy. *SAE Journal,* v. 66, June 1958, p. 40-42.

Precision gear-forming process; rotary forging process; cross-extrusion process. (F22, F24, T7a)

244-F. (German.) **Rolling Continuously Welded Billets.** A. E. Lendl and R. Preissler. *VDI-Zeitschrift,* v. 100, Feb. 1, 1958, p. 165-171.

Possibility of rolling continuous welded billets into wire and strip. (F23, F28, 4-52, 7-51)

245-F. (Italian.) **Singular Surface Defects Observed on Al-Si-Mg Alloys Extrusions.** F. Busnardo. *Alluminio,* v. 27, May 1958, p. 225-226.

The singular defects observed on the surface of extruded sections are attributed to irregularity of flow. Such defects occur when the ratio between the diameter circumscribed about the section and the diameter of the container is greater than 0.8. (F24, Q3, 9-71; Al, Mg, Si)

246-F. Manufacture and Metallurgy of Flash-Welded Line Pipe. M. A. Scheil, G. E. Fratcher, S. L. Henry and E. H. Uecker. *Engineering Journal,* v. 41, Feb. 1958, p.60-71.

10 ref. (F26p, K3r)

247-F. The Manufacture and Chief Uses of Aluminum Foil. Pt. 1. L. W. Swann. *Light Metals,* v. 21, July, 1958, p. 221-223.

Brief survey of rolling technique and the main applications.
(F23, T10g, 17-57; Al)

248-F. New Horizons in Forging Techniques. R. L. Albrecht. *Metal Forming & Fabricating,* v. 20, July 1958, p. 15-16.

(F22)

249-F. Induction Heating for Forging. P. E. Hammarlund and Y. Sundberg. *Metal Treatment and Drop Forging,* v. 25, June 1958, p. 249-253.

Design, frequency selection, power requirements, efficiency, advantages and disadvantages of induction heating. (F22, F21b, 1-69)

250-F. New Wire Mill Opened in Sheffield. *Wire Industry,* v. 25, June 1958, p. 545-547.

Review of the Kingfield Works of Darwins Bright Steels Ltd.
(F28, 1-52, 18-67)

251-F. Results of Testing the Operation of Blooming Mills. Pt. 2. Hans Gunther Muller and Werner Lueg. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1583-1593. (Iron and Steel Institute Translation no. 768.)

Previously abstracted from original. See item 41-F, 1958.
(F23, W23a, 4-52; ST)

252-F. Effect of Steelmaking Procedure on Billet Quality and Seamless Tube Yields. Vilem Friedrich. *Hutnicke Listy,* Dec. 1957, p. 1077-1083. (Iron and Steel Institute Translation no. 831.)

Previously abstracted from original. See item 132-F, 1958.
(F26s; ST-e, ST-g)

253-F. (English.) **Studies on the Rolling of Seamless Steel Tube.** Yoshiaki Yamada, Senzaburo Watake, Katsuro Inoue and Hideo Tani. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 63-65.

4 ref. (F26s; ST)

254-F.* (Russian.) **Light-Type Beam Rolling of Low Alloy Steel.** L. N. Soroko, A. A. Nefedov and V. N. Ershov. *Stah',* June 1958, p. 532-537.

Experimental rolling in 500-mm. rolling mill shows possibility of obtaining from existing equipment a new economical shape with higher mechanical properties at a relatively small reduction of rolling mill productivity. (F23p, W23d; AY)

255-F. New Rolling Mill at Port Kembla. *Chemical Industry and Engineering,* v. 11, June 1958, p. 18-19.

(F23)

256-F. Measurement of Rolling Force for 70:30 Brass and Aluminum. Yoshinori Tsunekawa, Moriya Oyane and Kohei Kojima. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 81-84.

3 ref. (F23; Al-b, Cu-n)

257-F. Republic Steel Unveils New Bar Mill. *Metal Products Manufacturing,* v. 15, Aug. 1958, p. 49-50.

Eighteen-million dollar addition to the South Chicago plant. (F23, 4-55)

258-F. (Russian.) **Production of Gas Pipes by Electric Welding.** Yu. M. Matveev. *Stal',* June 1958, p. 541-546.

Welding developments abroad, particularly the use of resistance and induction welding for pipe manufacture. 5 ref. (F26p, K3, K6n)

259-F.* (French.) **Investigation of the Forging of Alloy T-C_3Fe.** A. Saulnier and R. Develay. *Revue de Metallurgie,* v. 55, May 1958, p. 433-441.

The mechanical properties of forged products in T-C_3Fe (titanium with 2.7% Cr and 1.3% Fe) determined as a function of the temperature at the start of the first hot working, reduction of thickness during the hot working, and method of taking the specimens. Structures were observed with optical and electron microscopes. A clear difference in properties is established according to whether the forging temperature is within the $\alpha + \beta$ field (below 800° C.) or in the β field (above 800° C.).
(F22, Q-general; Ti, *Cr, Fe*)

260-F.* (French.) **Investigation of the Forging of Alloy T-A_6V.** R. Syre and A. Saulnier. *Revue de Metallurgie,* v. 55, May 1958, p. 442-447.

To achieve tensile strength of at least 92 kg. per sq.mm. in forged products in the titanium alloy T-A_6V (6% Al, 4% V) with elongations of at least 10%, it is necessary to transform the lamellar cast structure into an equiaxed structure. With forging beginning at 950° C. this cannot be achieved unless reductions of thickness of 80% are applied during final working. Reduction can be lowered to 50% either by decreasing the temperature at which forging is begun to 900° C. or by using a swaging pass before the final hot working.
(F22; Ti, *Al, V*)

261-F. Metal Forming for the Missile Age. Alexander Zeitlin. *Astronautics,* v. 3, Aug. 1958, p. 22-24.

New developments, such as 50,000-ton forging presses, explosive forming and cavity forming.
(F22, G-general)

262-F. Hot Forging With R. F. Induction Heating. *Brown Boveri Review,* v. 45, July 1958, p. 174-178.

Advantages of radio-frequency heating. (F21b, F22, W20L, 1-69)

263-F. Bar and Tube Straightening Machines. E. L. Tinley. *Iron and Steel,* v. 31, July 1958, p. 373-374.

(F29r, 1-52; 4-55, 4-60)

264-F. Lower Costs With No-Draft Forgings. Homer Harvey. *Materials In Design Engineering,* v. 48, Aug. 1958, p. 94-95.

(F22, Al-b, 4-51, 17-51)

265-F. (German.) **Calculation of Power Requirement in Upsetting and Drop Forging.** H. Mäkelt. *Werkstatt und Betrieb,* v. 91, June 1958, p. 337-341.

Calculating power requirement by means of six-part computation table. Deformation during upsetting; degree of deformation in hot forming.
(F22j, F22n)

266-F. Relationships in the Drawing of Metal Wire in Presence of Lubricants. S. Ya. Veiler and V. I. Likhtman. *Doklady Akademmii Nauk, SSSR,* v. 114, no. 6, 1957, p. 1224-1227. (Henry Brutcher, Altadena, Calif., Translation no. 4293.)

Elimination of concept of coefficient of friction from equations for calculating the forces required for a given type of deformation in the working of metals by pressure. Quantitative evaluation of effect of various lubricants in the working of metals by pressure, specifically the drawing of metal wire.
(F28; NM-h)

267-F.* (German.) **Cold Rolling of Steel of High Carbon Content With Sorbitic and Pearlitic Structure.** Wilfried Roth, Hermann Lassek and Fritz Fischer. *Stahl und Eisen,* v 78, July 10, 1958, p. 948-955.

Cold rolling of high-carbon steels, without intermittent annealing, revealed the superior malleability and tensile strength of sorbitic over pearlitic structure. No significant difference could be detected in tempering quality between cold rolled and soft rolled steels. Heat treating tests on Grade C 115 W 2 steel for mechanical and structural behavior indicated that deformed structure of cold rolled strip could be transformed into granular cementite at low temperatures and in a short time. Sorbitic steels offer a substantial cost reduction potential over pearliitic steels and may lead to refinements in strip mill processes. 14 ref. (F23, 1-67, Q-general, 2-60, 2-64, 2-71; ST, 4-53)

268-F.* (German.) **Effect of Different Working Conditions of a Three-Stand Cold Rolling Tandem Mill Train on Mechanical Properties of Steel Strip.** Jacques Gerhard Brockhaus, Fritz Fischer, Harald Graetz and Klaus Ohlwein. *Stahl und Eisen,* v. 78, July 10, 1958, p. 955-960.

Cold rolling of low-carbon strip steel, 0.98 × 1.50-mm., reduced 70 to 60% by a 178-mm. three-stand tandem mill train, reveals that total tandem mill capacity increases when reduction is greater at second and third mill stands. Tensile strength improves with highest reduction at third stand. Influence of rolling on proof stress, tensile strength and hardness can be remedied by annealing and rerolling. Greater rolling capacity and tensile strength result when blasting is used for descaling instead of pickling. Rerolling eliminates effect of different descaling methods on mechanical properties. Tallow emulsion is easier to apply than wax emulsion but impairs rolling capacity, rolling strength and tensile strength of strip steel. 4 ref. (F23, W23f, Q-general, 2-64; CN, 4-53)

269-F.* (German.) **Experiments on the Application of the Upsetting Process With Cone-Faced Pressure Dies in the Hot Upsetting of Metals.** Gerhard Gartner. *Freiberger Forschungshefte,* no. B27, 1958, p. 28-51.

The right inclination of the cone faces is essential for preserving the cylindric mantle surface of the test piece, due to the friction caused by the cone angle. In the hot upsetting process good results could be obtained only when temperature loss over the heat conducting pressure dies can be avoided. The experiments were preformed with pure Al, duralumin and electrolytic Cu. 11 ref. (F22j, 1-66; Al, Cu-a)

270-F.* (German.) **A New Theory of Rolling.** Alexander Geleji. *Freiberger Forschungshefte,* no. B27, 1958, p. 52-83.

A study on the different forces present when a material passes through the gap between rolls. Some older theories do not include all forces involved. Mathematical formula for resistance against deformation at any point showing the interplay of stresses during the rolling process, spread and forward slip. 19 ref. (F23; 10-51)

271-F.* (German.) **The Neutral Point Angle and the Forward Slip in a Rolling Process With Spread.** Zygmunt Wusatowski and Zbigniew Szalajda. *Freiberger Forschungshefte,* no. B27, 1958, p. 84-110.

Mathematical studies show that the forward slip grows with increased rolling pressure and decreased upsetting effect, while it is reduced by an increased temperature. With an unchanged upsetting effect, the forward slip decreases in the same porportion as the spread increases. The proportion neutral-point-angle/contact-angle decreases with an increasing spread and, as a rule, with an increased temperature. 9 ref. (F23)

272-F. **How to Get More for Your Forging Dollar.** *Iron Age,* v. 182, Aug. 21, 1958, p. 89-104.

Guide to purchase and most effective use of carbon and low-alloy steel forgings.
(F22. A4s; CN-b, AY-b, 4-51, 17-57)

273-F. **Cold Rollability of Transformer Steels Containing More Than 3.3% Si.** Franz Lihl and Paul Zemsch. *Archiv für das Eisenhüttenwesen,* v. 26, 1955, p. 599-602. (Iron and Steel Institute Translation no. 987.)

Previously abstracted from original. See item 261-F, 1955.
(F23, Q23q; AY, SGA-n, *Si*)

274-F. (German.) **A Special Slide Rule for Ekelund's Formulas.** Stanislaw Koncewicz. *Freiberger Forschungshefte,* v. B27, 1958, p. 111-127.

Rolling forces. 4 ref. (F23)

275-F. (German.) **Factor of Mean Elongation With Profiled Roll Passes.** Kazimierz Rytel. *Freiberger Forschungshefte,* v. B27, 1958, p. 128-140
(F23)

276-F.* (Hungarian.) **Theories of Tube Reduction.** Nandor Torma. *Kohaszati Lapok,* v. 91, Apr. 1958, p 191-195.

Rolling procedure in which the external diameter of the tube gradually decreases. There is no forming tool in the tube, consequently thickness of wall may form freely. Investigations were performed with two power-driven tube reducing roll systems, one for the small tubes, the other for larger sizes. Reduced wall thickness can be accurately calculated from rolling speed. 7 ref. (F26s)

277-F. **The Calculation of Drawing Force and Die Pressure in Wire-Drawing.** P. W. Whitton. *Wire Industry,* v. 25, Aug. 1958, p. 735-738

Various wire drawing theories examined in light of new knowledge of the values for the coefficient

of friction between the drawn wire and the die. (F28, Q9p)

278-F. (Russian.) **Monograph for Determination of Radius of Deformation in Cold Rolling of Strip and Sheet.** D. Ya. Gurevich. *Stal'*, v 18, July 1958, p. 635-638.
(F23, Q23q; ST, 4-53)

279-F.* (Russian.) **Automatic Control of Shearing of Rolled Stock.** V. L Enshtein. *Stal'*, v. 18, July 1958, p 622-628.

Investigation of rolling process in a 630/450-mm. rolling mill makes it possible to develop a schedule and block-diagram of a digital computer for automatic control of shearing according to theoretical weight of rolled stock.
(F29q, X14k, 1-52; ST)

280-F. Where Faster Heating Saves. C. A. McFadden. *Steel*, v 143, Sept. 1, 1958, p. 68, 70, 72, 73
(F21b, J-general; ST, 17-53)

281-F. Gear Forging Advances. *Steel*, v. 143, Sept. 8, 1958, p. 100-101
(F22, T7a)

282-F.* Nomograms for Drawing Force and Power Consumption in Wire Drawing. *Draht (English Edition)*, no. 35, June 1958, p. 31-36.

Nomograms giving relationships between wire drawing variables enables rapid approximation of drawing force and power consumption from values of plastic deformation, strength, reduction of cross-sections inlet or outlet diameter and drawing speed. 5 ref. (F28)

283-F.* (Czech.) **Working Life of Forging Dies.** Jiri Elfmark. *Hutnické Listy*, v. 13, no. 7, 1958, p. 612-620.

Effects of steel type, heat treatment, die design, forging temperatures, mill scale, die lubrication, die cooling and form of forging on die wear. Study of the life of dies made of CSN 19650 steel with varying degrees of die complexity indicates that greatest wear occurs on transition of form in burr and on projection edges. Welding wearing surfaces to prolong die life.
(F22, W22a, Q9; ST)

284-F. Punch Cards Lead Drive to Automatic Mill Control. G. J. McManus. *Iron Age*, v. 182, Sept. 11, 1958, p. 169-171.
(F23, W23, X14; 18-74)

285-F. Precision Forgings Minimize Machining. Alfred G. Jones. *Tool Engineer*, v. 41, Sept. 1958, p. 95-97.

Thermal resistant alloys require special tools, machines and methods to obtain the finishes required for aircraft. Precision forging of these alloys has reduced machining to a minimum since parts are forged to size with no excess stock.
(F22; SGA-h)

286-F. (Russian.) **New Method of Determining Forgability of Metals.** D. I. Berezhkovskii. *Zavodskaya Laboratoriya*, v. 24, no. 7, 1958, p. 858-860.
(F22, 17-52)

287-F.* (German.) **Metallurgical Principles in the Production of Copper Sheet.** Otto Nielsen. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, Aug. 1958, p. 355-360.

Importance of structural differences in cake types and copper grades in sheet production. Employment of proper atmospheres, temperatures and heating periods. Good practice in hot rolling, surface treatment and pickling.
(F23; Cu, 4-53)

288-F. Effect of Temperature of Finish Forging on Properties of Forgings. I. G. Generson. *Metallovedenie i Obrabotka Metallov*, Aug. 1958, p. 46-51. (Henry Brutcher, Altadena, Calif., Translation no. 4322.)

Steel for turbine disks containing 0.45% C; 0.20% Si; 0.65% Mn; 0.96% Ni; 0.018% S and 0.022% P was melted in 10-ton basic electric furnace. As result of experiments changes have been made in heating procedure in many foundries. Temperature of finish forgings has been increased to 1050-1080° C. The starting temperature has been changed from 900 to 1250° C. Ingots are kept in furnace 2-3 hr. Change in heating procedure has increased productivity by 10-20%.
(F22; AY)

289-F.* (Russian.) **Rolling Rail Steel From Heavy Ingots.** M. M. Gorenshtein and Z. A. Yashchenko. *Stal'*, v. 18, Aug. 1958, p. 711-715.

Experiments in rolling heavy ingots in 170-mm. blooming mill so as to define the effect of rolling rate on power characteristics and to develop an efficient schedule of reductions and rolling rates so as to secure maximum production at normal operating conditions without overheating motor.
(F23, T23q; ST)

290-F.* (Russian.) **Production of Two-Layer Soldered Tubes.** P. K. Teterin and N. L. Klyamkin. *Stal'*, v. 18, Aug. 1958, p. 722-726.

Production of thin-walled two-layer tubes by soldering has many advantages over production by drawing. They can replace seamless steel tubes as well as copper and brass tubes with large saving of nonferrous metal. Their mechanical properties in every respect equal those of seamless steel tubes. (F26p, K7; ST)

291-F.* **Forging Blooms From Ingots.** John E. Decker. *Metal Progress*, v. 74, Sept. 1958, p. 71-73.

A short, heavily tapered ingot is forged after the piped zone is isolated from the sound steel by a punch. Tests show the blooms to be sound and free from segregation. (F22, D9k; ST, 4-52, 5-59)

292-F.* **Fabrication and Cladding of Thorium Metal.** J. E. Cunningham. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 225-265.

Current status of technology for mechanically working thorium. Conversion of Th ingot into primary shapes by forging, rolling and extrusion, and working the metal by secondary operations such as swaging, drawing, cold finishing and machining. Techniques for preparing Al and Zr-clad Th products for reactor service. 24 ref. (F-general, L24; Th)

293-F.* (Russian.) **Mechanical Beveling of Rails.** V. V. Trofimov. *Metallurg*, v. 3, Aug. 1958, p. 29-31.

Changeover from manual to mechanical beveling made it possible to increase the working temperature from 550 to 750°. Beveling at higher temperatures reduces spoilage, rails emerge straighter after cooling off and their mechanical properties are improved. (F29; ST, 4-57)

294-F. **Control Equations of Multistand Cold Rolling Mills.** G. Lianis and Hugh Ford. *Institution of Mechanical Engineers, Proceedings*, v. 171, 1957, p. 757-776. (F23, 1-67)

295-F. **Remote Control of Roll Screwdowns.** *Iron and Coal Trades Review*, v. 177, Aug. 15, 1958, p. 371-376. (F23, W23n)

296-F.* **The Extrusion Process.** *Precision Metal Molding*, v. 16, Oct. 1958, p. 36-38.

Three general methods in common use are direct, indirect and impact extrusion. Corrosion resistance, machinability and mechanical properties of extrusions. (F24, G5, G17k, Q-general, R-general; 4-58)

297-F.* **Designing for Extrusions.** *Precision Metal Molding*, v. 16, Oct. 1958, p. 44-47.

Chemistry, physical properties and mechanical properties of nine extrudable Al alloys. (F24, P-general, Q-general; Al, 4-58)

298-F.* **Improvement of Welded Structures by Subsequent Forging Operations.** W. R. Wollering and E. H. Lundby. *SAE Transactions*, v. 66, 1958, p. 261-266.

Method results in development of physical properties in welded sections of alloy materials approaching those of the wrought parent material. Advantages include weight reduction in dynamically stressed wrought steel assemblies, increase in design factor values, conservation of critical alloy materials. (F22; 7-51)

299-F.* (Rumanian.) **Determination of the Free Spreading of Nonferrous Metals When Rolling by Noncalibrated Cylinders.** R. Miculescu, S. Bercu and I. Dragan. *Studii si Cercetari de Metalurgie*, v. 1, Jan-June 1956, p. 107-117.

In order to set up formulas and nomograms enabling the rolling operator to calculate the magnitude of spreading of metals during the rolling, a whole series of experiments were made, which herein are given in the form of tables. As a result of the comparative study between nonferrous metals and steel, it has been found that the same factors determine decisively the magnitude of the spreading during the rolling. The authors also have established a formula by which one can determine analytically the magnitude of the spreading in the case of rolling of these metals. For aluminum, it has not been possible to find a general formula, but it has been established that this metal presents a more pronounced spreading in function of the absolute magnitude of the reduction of height in comparison with the spreading of the copper or of the brass. 3 ref. (F23; Al, Cu)

300-F.* (Rumanian.) **Investigation of the Conditions of Adhesion in Rolling.** R. Fischgold. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 119-147.

Attempt to give a quantitative and qualitative appreciation of the reserves of friction forces existing during the transition from the initial moment of contact to the stabilized process by assuming for basic index the ratio $K = \frac{\alpha_{II}}{\alpha_I}$ (α_I being the angle of initial contact and α_{II} the contact angle in the stabilized phase of the rolling process). This coefficient is a function of the following factors: rolling temperature, nature and composition of the metal rolled, complexity of the rolling scheme, conditions of friction on the contact surface between the deformed metal and the cylinders. The coefficient K decreases as the rolling temperature rises, according to an almost linear relation. There is a pronounced decrease of the friction angle ψ_{II} in comparison with ψ_I in the case of hot rolling; for the cold rolling the value of ψ_{II} is considerable closer to that of ψ_I. 9 ref.

301-F.* **High Production Flat Rolling.** C. S. Ball and C. W. Starling. *Sheet Metal Industries,* v. 35, Oct. 1958, p. 767-774.

Integrated steelworks and continuous hot strip mill is an extremely complicated organism. Such a process may eventually break down because of its own complexity. Basic trends in the development of steel production and hot rolling are the direct manufacture of steel from ore; the direct manufacture of hot rolled sheet from pig iron and the development of the conventional sequence of blast furnaces, melting and refining furnaces—casting to solid form—hot rolling. 5 ref. (F23, W23c)

302-F. **Factors Influencing the Accuracy of the Rolling of Sheet and Strip and Their Control by Experiment and by Calculation.** O. Emicke and K. H. Lucas. *Neue Hütte,* v. 1, 1956, p. 257-274. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 150-F, 1956. (F23, W23c)

303-F. **Calculation of Cooling Characteristics of Barstock on Cooling Beds and the Suitability of Certain Cooling Bed Designs for Material of Different Compositions and Profiles.** Paul Gruner. *Draht (English Edition),* no. 36, Aug. 1958, p. 19-26.

Factors facilitating and impeding heat exchange and cooling are summarized. (F21; 5-59, ST)

304-F. **Liquid Slag Removal From Soaking Pits.** Stukalov. *Stal',* v. 17, no. 2, 1957, p. 169-173. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(F21b, W20g; RM-q)

305-F.* **Semi-Continuous Hot-Strip Rolling With Automatic Programme Control.** A. Hegarty. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 623-625.

New 44-in. mill rolls over 100,000 tons of coiled strip steel per month. Strips of varying gages and up to 40 in. wide are produced for pipe mills. Automatic control, using punched card, offers maximum utilization of equipment and greater uniformity of product. (F23, 1-61, 18-74, W23c; ST)

306-F.* (German.) **Properties and Manufacture of Aluminum Wire.** H. D. Feldmann. *Aluminium,* v. 34, Sept. 1958, p. 530-537.

Materials used in production and mechanical properties of rolled, extruded and cold drawn wire. Mechanical and electrical properties degraded by excess of Si. Influence of heating before rolling. (F28, Q-general, P15; Al, 4-61)

307-F.* (German.) **Manufacture of Aluminum Pipe by High-Frequency Resistance Welding.** *Aluminium,* v. 34, Sept. 1958, p. 540-543.

"Thermatool" method applied in welding preformed Al pipe, using high frequency. Advantages of heating only a thin surfacial layer. Other applications: welding of cold and hot rolled steel, tin-plated sheet, copper, brass; cable sheaths. (F26p, K3; Al, ST, Cu)

308-F. **Servo-Control of Strip Thickness in Rolling Mills.** P. R. A. Briggs. *Automation Progress,* v. 3, Aug. 1958, p. 291-293, 297.

System in which elastic deformation of rolling mill itself and screw position of rollers is measured and corrected for temperature changes, allowing strip thickness to be computed. (F23q, W23c, S14b)

309-F. Electromagnetic Control of Rolling Mill Machinery. A. Asbury and H. Law. *Automation Progress,* v. 3, Aug. 1958, p. 294-297.

(F23q, W23c, 18-74)

310-F. Extrusion. *Metal Industry,* v. 93, Oct. 3, 1958, p. 271-273.

Discussion of papers presented at the Institute of Metals Autumn Meeting. (F24, G5)

311-F. Forging-Quality Steels. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 385, 386.

Refining, casting ingots, segregation, surface treatments. (F22; ST)

312-F. Titanium Wire and Extrusions. J. R. Crane. *Wire Production,* v. 7, Apr-June 1958, p. 7.

Drawing and extrusion techniques. (F24, F28; Ti, 4-61)

313-F. Some Problems Arising During Investigation of the Extrusion Forces When Extruding Circular Full Shapes From Aluminum and Aluminum Alloy Through Single Multiple Aperture Dies. I. Kochish. *Acta Teknika, Academiae Scientiarum Hungaricae,* v. 15, 1956, p. 381-419. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB61.)

Previously abstracted from original. See item 232-F, 1956. (F24; Al)

314-F. Calculation of Pressures Required in the Extrusion of Light Metal Shapes. H. Hornauer. *Aluminium,* v. 36, 1956, p. 350-356. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1483.)

Previously abstracted from original. See item 157-F, 1956. (F24; Al)

315-F. (French.) **Ugine-Sejournet Process for Hot Extrusion of Steel.** G. Leclerc. *Technique Moderne,* June 1958, p. 243-248.

8 ref. (F24; ST)

316-F. (German.) **Systematic Classification of Deformation Operations. Pt. 2.** W. Engelhardt. *Fertigungstechnik,* v. 8, Sept. 1958, p. 418-422.

(F-general, G-general, Q-general)

317-F. (Russian.) **Automation of Tube Rolling Mills.** I. G. Mindlin. *Metallurg,* v. 3, Sept. 1958, p. 29-31.

First fully automated tube mill in the USSR turns out tubes with diameter from 170 to 350 mm. for use in oil wells, machine building, coal mining and electric power stations. (F26s, W23h, 18-74)

318-F. Development of Practices for Commercial Production of Titanium and Titanium Alloy Wire. Driver Harris Co., Harrison, N. J. *U. S. Office of Technical Services,* PB 126530, June 1955, 34 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3; Photostats $6.30.)

(F28; Ti-b)

319-F. Development of 650 Pound Billets of 3% Al-5% Cr-Titanium Alloy. S. S. Smith, Jr. Menasco Manufacturing Co. *U. S. Office of Technical Services,* PB 127147, Mar. 1955, 8 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

Purpose of the work was to successfully manufacture four forging billets for landing gears. (F23n, F22; Ti-b)

320-F.* How Alloying Elements Affect Steel Forgeability. G. P. Contractor and W. A. Morgan. *Iron Age,* v. 182, Nov. 13, 1958, p. 142-146.

Forgeability of various steels measured by number of twistings to failure at temperatures between 1900-2500° F. is strongly affected by C, Mn, S, Ni, Si and Cr, less so by Pb and N. O, P, Co, V and Ti have little effect. (F22, 17-52; ST, SS)

321-F.* (Czech.) **Flattening of Sheet Metal.** Jindrich Matas. *Zvaranie,* v. 7, July 1958, p. 219-220.

Flattening of uneven spots by heating the convex side. For 1 to 3-mm. sheet metal, use of an oxy-acetylene torch suggested, together with a circular steel plate through which compressed air passes, to heat an area of only 9 mm. diameter while the rest of surface is cooled. Sheet metal under 1 mm. can be resistance heated by passing a wedge-pointed carbon electrode (negative in the case of d-c.) over the surface. (F29s)

322-F.* Three New Ways to Make Precision Forgings, Extrusions. John F. Murphy. *Materials in Design Engineering,* v. 48, Nov. 1958, p. 105-107.

Rotary press forging, precision gear forging and cross extrusion provide close tolerances without machining as well as parts of high

strength. Specific applications of these processes. (F22, F24, 1-52)

323-F.* Some Limiting Factors in Extrusion. S. Hirst and D. H. Ursell. *Metal Treatment,* v. 25, Oct. 1958, p. 409-413, 416.

Limitations on the extrusion ratio imposed by the dimensions and preheat temperature of the billet for any given press capacity may be expressed in the form of a family of curves on a graph of extrusion ratio against preheat temperature. Extrusion ratio is also restricted by unacceptable temperature rise due to heat input and this limitation can be expressed on the same graph, thus defining an enclosed area in which extrusion is possible for any given conditions. (F24)

324-F.* Metallurgical Examination of Forging-Quality Steels. J. D. Bunton. *Metal Treatment,* v. 25, Oct. 1958, p. 414-416.

Factors affecting forgeability include piping, excessive segregation, heavy stringers and corner weakness. Properties in a steel to insure satisfactory hardenability and machinability. (F22, G17k, 17-52; ST)

325-F.* Processing of Wrought Steel to High Strength. L. H. McCreery. *SAE Journal,* v. 66, Oct. 1958, p. 70-74.

Processing of 4340 steel is feasible if steel used has the capability to be heat treated to high strength with significant ductility; rolling or forging process is performed in a quality manner with no overheating or burning; machining processes are performed carefully and completely; heat treatment used is completely adequate as to process, times and temperatures. (F22, F23; AY)

326-F.* Processing Wrought Steel to High Strength. L. H. McCreery. *Society of Automotive Engineers,* Preprint no. 82B, 1958, 19 p.

Heat treatment, rolling, forging machining and finishing operations. (F-general, G-general, J-general; ST, SGB-a)

327-F.* How to Forge Molybdenum. *Steel,* v. 143, Nov. 3, 1958, p. 84-86.

Remedies for the following problems: high-impact velocity needed to begin plastic flow; oxidation; loss of control of furnace temperature. (F22; Mo)

328-F.* (Russian.) **Main Reasons for Variations in Thickness of Hot Rolled Strip Produced in Continuous Rolling Mill.** P. I. Grudev. *Stal',* v. 18, Sept. 1958, p. 813-817.

The elimination of gage variations may be achieved by providing for automatic displacement of mill screwdowns, depending on length, and consequently on temperature, of rolled strip. To prevent the influence of incidental factors on strip thickness it is advisable to use metal pressure on rolls as signal, initiating displacement of the mill screwdowns. (F23, 1-66, 1-61; ST)

329-F.* (Russian.) **Mastering the Technique of Rolling Heavy Plate According to Theoretical Weight.** I. D. Kuzemka. *Stal',* v. 18, Sept. 1958, p. 817-820.

Allowances calculated in conformity with a special method; rational roll design with reduction of roll wear (plus deflection); regular control of plate thickness and roll profile during rolling, with corresponding adjustment of thickness allowances where needed. (F23, W23b, 17-51)

330-F.* (Russian). **Influence of Metal Structure and Mechanical Properties of 08 KP Steel on Its Forgeability.** B. S. Natapov and D. E. Tsivirko. *Stal',* v. 18, Sept. 1958, p. 828-834.

Investigation to establish relationship between the physico-mechanical properties of sheet steel as determined in laboratory tests and its performance during forging. Main reasons for rejected forgings during deep drawing are the gross metallurgical flaws, reduced ductility and increased metal stiffness, as well as failure to observe correct methods during drop forging. To improve properties of sheet steel it is necessary to decrease its yield point and increase uniformity of sheet. 12 ref. (F22n, 17-52, G4b; ST, 4-53)

331-F.* (Russian.) **Durability of Diamond Drawholes for Micron Size Wire.** G. P. Gvosdyk and N. F. Andrianov. *Stal',* v. 18, Sept. 1958, p. 839-842.

Durability is greatest where the metal is purest (free of inclusions) and where the annealing temperature of ingots is high (to 1050°). The thinner the diameter of the wire and the greater the drawing speed, the greater the durability of drawholes. Durability is considerably lower during first draws, and

with increase in number of draws and in speed, the durability increases. It is greater when the pressure is lower (but that necessitates a greater number of drawholes). (F28, W24k; NM-k37)

332-F. Metallurgy of Electric Resistance Welded Steel Pipe. J. Gordon Parr. *Canadian Mining and Metallurgical Bulletin,* v. 51, Oct. 1958, p. 624-629.

Effect of mill variables on the metallography of welds as it is affected by variations in heat input, mill speed, pipe contour, edge condition and steel defects.
(F26p, K3, M27; SS)

333-F. Hot-Cold Forming Boosts Quality, Prunes Costs. *Steel,* v. 143, Nov. 3, 1958, p. 72-74.

Combination hot cup, cold draw process for 8-in. howitzer shells.
(F22, G4, 1-66, 1-67; CN)

334-F. Rotary Forging Turns Profits Up. *Steel,* v. 143, Nov. 10, 1958, p. 122-123.

(F22, W22r)

335-F. Hot Roll Forms Titanium. *Steel,* v. 143, Nov. 17, 1958, p. 114.

(F23; Ti-b)

336-F. (German.) **New Extrusion Methods.** *Aluminium,* v. 34, Sept. 1958, p. 538-539.

Short survey: Use of hydraulic presses for extruding steel; new type hydraulic press for high-speed extruding; new press for cable sheathing with Al.
(F24, W24g; Al, SS)

337-F. (German.) **Deformation Rate in Hot Rolling.** Zygmunt Wusatowski. *Neue Hütte,* v. 3, Aug. 1958, p. 494-497.

Derivation of a relation for the deformation rate during rolling. 5 ref. (F23)

338-F. (German.) **Nomographs Based on S. Ekelund's Equation on the Forces Effective in Rolling.** Alfred Mathea. *Stahl und Eisen,* v. 78, Oct. 2, 1958, p. 1383-1389.

Nomographs aiding in computation of forces for heavy and light plate rolling. (F23, U4q)

339-F. (German.) **Forces Effective in Die Forging.** H. Lippmann and F. Neuberger. *Werkstattstechnik und Machinenbau,* v. 48, Aug. 1958, p. 449-452.

(F22)

340-F. (Polish.) **Analysis of the Trend in Expansion of Tube Rolling Plants in Poland.** Wladyslaw Dobrucki. *Hutnik,* v. 25, June 1958, p. 195-201.

Polish production of gas, industrial, drilling, boiler and construction pipe. Statistical data. Forecast of pipe requirements of Polish industry for the next three years.
(F26s, W23h)

341-F. (Polish.) **Experimental Investigation of Rolling.** Joachim Jonca and Jerzy Rabalski. *Hutnik,* v. 25, June 1958, p. 201-206.

Determination of magnitude of rolling momentum, of pressure exerted by the rollers, and of power demand of a rolling mill. Measurement of the rolling process. (F23)

342-F. (Polish.) **Prospects of Expansion of Production of Tubes With Seams.** Zygmunt Korek. *Hutnik,* v. 25, June 1958, p. 206-210.

Survey of steel pipe production in Poland. Welding of pipe with different seam requirements. Cost analysis of different processes of pipe production. Economical advantages of production of seamed pipe. 4 ref.
(F26p; ST)

343-F. (Russian.) **Determination of Machine Time for Rolling Thin Sheet With Doubling.** Sh. A. L'vovskii. *Stal',* v. 18, Sept. 1958, p. 821-823.

(F23, A5; 4-53)

SECTION G

SECONDARY MECHANICAL WORKING

1-G. Surface Grinding Aluminum Products. John E. Hyler. *Light Metal Age,* v. 15, Oct. 1957, p. 38. (G18k; Al)

2-G. Grinding Titanium. S. B. Watts. *Light Metals,* v. 20, Oct. 1957, p. 336-337. (CMA)

Titanium is easily ground at Lockheed by using speeds of less than 1800 sfpm., a nitrite-amine rust inhibitor as a cutting fluid, and (for cylindrical grinding of the center type) 400-500 in. table feed, 0.001 in. downfeed and 0.05 in. crossfeed. (G18; Ti)

3-G. Development in Methods of Forming Titanium. *Machinery (London),* v. 91, Oct. 11, 1957, p. 853-857. (CMA)

The Aircraft Engine Division of Ford has developed forming methods for inlet guide vanes and compressor blades from titanium sheet. Procedures for folding sheet in a heated tool, resistance welding the trailing edges and expanding in a closed die to give the finished vane, and for roll-forging the compressor blades from an induction heated blank. (G1; Ti)

4-G. Dimensional Etching. Its Application to Airframes. Richard H. Andrew and Jacques L. Duvall. *Plating,* v. 44, Nov. 1957, p. 1186-1190.

Chemical milling process. 5 ref. (G24b, T24)

5-G. HRP Titanium Fabrication Experience From Loop T-1 Construction. P. A. Haas. *U. S. Atomic Energy Commission,* CF-56-3-167, Mar. 15, 1956, 11 p. (CMA)

Titanium is easily arc welded to give sound joints with high tensile strength. Oxygen, hydrogen or nitrogen pickup from air or water vapor causes cold embrittlement, and the metal must be protected by an inert gas atmosphere until it cools below 1100° F. The machinability of titanium is comparable to that of stainless steel. (G17, K1; Ti)

6-G. Transfer Lines Build Buick's New Dynaflow. *American Machinist,* v. 101, Nov. 4, 1957, p. 135-140.

Permanent mold Al castings for the case and rear bearing retainer are machined. (G17, 18-74; Al, 5-63)

7-G. Effect of Tool-Chip Contact Area in Metal Machining. H. Takeyama and E. Usui. *Journal of Applied Mechanics,* Paper no. 57-A-45, 1957, p. 1-5.

Results of experimental, two-dimensional machining of brass tubes with tools specially designed to keep tool-chip contact areas constant. Analysis of coefficient of friction, stress distributions on rake face, significance of tool-chip contact area as related to machining performance. 10 ref. (G17; Cu-n)

8-G. Metal Spinning. New Imported Equipment Spins Economy Into Aircraft and Missile Parts. *Missiles and Rockets,* v. 2, Oct. 1957, p. 110-117. (G13, 1-52)

9-G. Cold Forming in Missile Production. *Missiles and Rockets,* v. 2, Oct. 1957, p. 118-119.

Cold extrusion at Norris-Themader Corp. (G5)

10-G. (German.) **Machining of Aluminum With Diamonds and Cutting of Close-Tolerance Threads.** K. Sterl. *Aluminium,* v. 33, Sept. 1957, p. 613-615.

Various forms of turning, recessing and drilling with diamonds; choice of tools and their treatment. Internal threads are best cut with single-pass plug taps with ground threads, narrow tooth webs and wide grooves; a new "elastic" tool

for external threading.
(G17; Al, SGA-j, NM-K37)

11-G. (German.) **Forming of Threads.** *Draht,* v. 8, Aug. 1957, p. 293-296.

The technology of warm and cold threading, particularly of material of high tensile strength; dies and rollers are used for forming threads, the tools being mounted on various types of semi-automatic and fully automatic threading machines.
(G17f)

12-G. (German.) **Theory of Stock Removal.** M. Kronenberg. *Werkstatt und Betrieb,* v. 90, Oct. 1957, p. 729-733.

The chip is considered as a moving system. A formula establishes a relationship between the chip compression factor, the coefficient of friction and the true rake angle of the tool. 8 ref. (G17)

13-G. (Japanese.) **Cutting by Powder Method.** Minoru Iwasa. *Casting Institute of Japan, Journal,* v. 29, Aug. 1957, p. 621-626.

Cutting of stainless steel and copper alloys by heat of oxidation of iron powder. Concrete and firebrick were also cut by iron and aluminum powder. (G22; Cu, SS)

14-G. (Russian.) **Deep Drawing of Certain Sheet Metals and Alloys at Various Speeds With Application of Heat.** N. A. Klyucharev. *Vestnik Mashinostroeniya,* v. 37, Aug. 1957, p. 40-45.

Drawing of steel, brass, aluminum and duraluminum; design of the press; drawing coefficients at speeds of 0.2 and 43 cm. per sec.; wall thicknesses at different height levels of the drawn specimen.
(G4b, 1-66; ST, Cu-n, Al)

15-G. (Russian.) **Influence of Soft Sheet Steel Properties Upon Durability of Punching Stamps.** P. G. Kovtun. *Vestnik Mashinostroeniya,* v. 37, Aug. 1957, p. 46-47.

Investigation of working life of deep drawing stamps in respect to size of ferrite grain and carbon contents of the sheet steel.
(G4b, 1-52; CN)

16-G. Special Techniques for Increasing Strength and Fatigue Life of Steel Stressed in Torsion. N. E. Hendrickson. *ASTM Bulletin,* v. 224, Sept. 1957, p. 40-42.

Shot peening and presetting make it possible for 40 lb. of steel in torsion bar springs to do a job that would otherwise require almost twice as much material. 4 ref.
(G23n, T7c; ST)

17-G. How to Remedy Defects in Drawn Shells. Federico Strasser. *Iron Age,* v. 180, Nov. 21, 1957, p. 125-127.
(G4c, 9)

18-G. Resistance Heating Titanium Alloys for Press Brake Forming. *Machinery (London),* v. 91, Oct. 18, 1957, p. 917. (CMA)
(G4d, W28; Ti)

19-G. Forming Titanium With Particular Reference to the Production of Aircraft Components. J. S. Kirkpatrick. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 825-830. (CMA)

Forming on stretch press, press brake, deep drawing and skinning.
(G4d, G9, G13; Ti)

20-G. Choose the Right Lubricant. Pt. 2. *Steel,* v. 141, Oct. 21, 1957, p. 100-101.

Types of lubricant for drawing and forming operations. (G4; NM-h)

21-G. Tips on Turning Heat Treated Steels. *Steel,* v. 141, Nov. 25, 1957, p. 94-95.
(G17a, 2-64; ST)

22-G. Short Run Dies Offer Long Life. *Steel,* v. 141, Dec. 2, 1957, p. 94-96.

New ideas and methods of pressing lengthen life of dies. (G3, W24n)

23-G. Chem-Milling Handles Tough Job. *Steel,* v. 141, Dec. 2, 1957, p. 114.

Advantages of this complex method used in production of aircraft part. (G24b, T24a; Al)

24-G. From Sandstones to Diamonds —the Grinding Wheel Story. F. W. Foerste. *Welding Engineer,* v. 42, Dec. 1957, p. 34-37.
(G18, 6-69)

25-G. Understanding Grinders and Grinding Wheels. *Welding Engineer,* v. 42, Dec. 1957, p. 41-43.

Uses for grinding wheels; factors in selection of wheels; work speed; types of machines available. (G18)

26-G. Application and Working of Honeycomb Core. Pt. 2. W. A. Nordhoff. *Western Machinery and Steel World,* v. 48, Nov. 1957, p. 90-93.
(G general, T24a; 7-59)

27-G. Spinning Titanium Pressure Vessels. Fred Spiegl. *Western Metals,* v. 15, Nov. 1957, p. 48-49.
(G13, T26q; Ti)

28-G. Radial Draw Forming Contributes Design Economies for Jet Transport Production. *Western Metals,* v. 15, Nov. 1957, p. 44-46.
(G4, T24a)

29-G. (Dutch.) **Method for Putting a Linear Network Upon Metal Surfaces.** J. H. Zaat. *Metalen,* v. 12, Oct. 15, 1957, p. 387-390.

A method for applying to a metal surface a linear network (raster) which will adhere well, resist deformation and which has clear and sharp lines. This linear network is used for measuring deformations which occur in nonchipping metalworking. One of the most important applications is the processing of sheet material. (G24b, G24d, L13q)

30-G. (French.) **Ceramic Tools for Turning Operations.** A. B. Albrecht. *Machine Moderne,* v. 51, Oct. 1957, p. 41-45.

Tools made of ceramics and oxides can improve cost prices and production times in high-speed turning operations. The accuracy of the process is extremely good. Powerful machine tools with high accuracy and high speeds are needed. (G17a, T6n; 6-70)

31-G.* (German.) **Rimming Steel.** Heinz Becker and Hubert Hoff. *Stahl und Eisen,* v. 77, Sept. 1957, p. 1215-1220.

Structure, mechanical properties, cutting forces, face wear, abrasion, chip volume and surface roughness during and after machining; effect of the Mn and Pb content on the machinability of free-cutting steel of the rimming type. 4 ref. (G17k, 2-60; ST-d, *Pb, Mn*)

32-G. (German.) **Tool Wear in Machining.** Gustav Vieregge. *Stahl und Eisen,* v. 77, Sept. 1957, p. 1233-1244.

Wear-cutting speed curves as a means of determining the importance of the types of wear in cutting tool life. Influence of feed, process and tool material (toolsteel, stellite, carbides and ceramic) on the material machined (carbon steel and gray iron castings). 10 ref. (G17, Q9; CN, CI-n, TS, 6-69, 6-70)

33-G.* (German.) **Gas Cutting in Modern Production.** H. Christoph. *Schweissen und Schneiden,* v. 9, Oct. 1957, p. 441-447.

Physico-chemical fundamentals; increasing the efficiency of electrical machinery manufacture by use of flame cutting; effect of design of cutting machine; control of cutter head, shape of nozzle; nature of the fuel gas on cutting accuracy. 5 ref. (G22g)

34-G. (German.) **Progress in Stamping Technique.** Hans Krause-Dieter-ing. *VDI Zeitschrift,* v. 99, Sept. 1, 1957, p. 1218-1220.

Influence of sharp and dull cutting edges, sheet tenacity, tool surfaces and lubrication; data for designing and manufacturing dies. 8 ref. (G3, W24n)

35-G. (German.) **Fabrication of Hollow Bodies.** Fritz Singer. *VDI Zeitschrift,* v. 99, Sept. 1, 1957, p. 1223-1226.

Modern methods and machines; use of heat resistant and high-tensile alloys. (G1, G9, G11, W24g; SS, AY, SGA-h)

36-G. (Japanese.) **Sintered Carbide Face Milling Cutters. Pt. 2 and 3.** M. Okoshi and N. Shinozawa. *Scientific Research Institute, Reports,* v. 33, July 1957, p. 185-208.

Power consumption and cutting force with double radial rake. (G17b)

37-G. (Japanese.) **Surface Finish in Fine Turning.** M. Okoshi, T. Sato and A. Kamogawa. *Scientific Research Institute, Reports,* v. 33, July 1957, p. 209-227.

Surface finish in relation to cutting conditions, tools, materials and machine vibration. (G17a)

38-G. (Russian.) **Influence of Hardness and Microstructure of Alloy Castings on Their Machinability.** N. P. Golubkov. *Stanki i Instrument,* v. 28, July 1957, p. 22.

By investigating cutting speeds of various castings a formula was worked out for determining the rate of cutting for given ranges of hardness. (G17k, 5-60)

39-G. (Russian.) **Anti-Galling Drawing Compound for Steel Products.** S. A. Valiev. *Vestnik Mashinostroeniya,* v. 37, June 1957, p. 38-39.

Iron hydroxide in powder form has excellent qualities of dispersion and covers metallic surfaces readily. (G4; NM-h)

40-G. Automation in Roller Bearing Manufacture. *Industrial Finishing, (London),* v. 9, Nov. 1957, p. 927-929.

Tapered roller bearings of Ni alloy steel are given a precision finish by grinding operations on automatic production lines at British Timken Ltd. (G19, T7d; *Ni,* ST)

41-G. Metal Cutting Research. *Iron and Steel,* v. 30, Dec. 1957, p. 647-651.

Investigations into such factors as machine tools and cutting fluids. (G17, A9)

42-G. Cutting Costs With Abrasive Belts and Abrasive Belt Machines. Thomas J. Reid. *Metal Finishing,* v. 55, Dec. 1957, p. 65-66.

(G18, W25s)

43-G.* Fabricating Techniques for Jewelry. Ralph H. Atkinson. *Metal Progress,* v. 72, Dec. 1957, p. 94-98.

Blanking, coining, stamping and pressing are the methods most used for producing jewelry shapes. These, plus soldering and finishing, are the basis of the manufacturing jeweler's craft. (G general, K7, L general, T9s; 17-7; EG-c)

44-G. Extrusion Presses and Press Installations. E. K. L. Haffner and R. M. L. Elkan. *Metallurgical Reviews,* v. 2, 1957, p. 263-303.

18 ref. (G5, 1-52)

45-G. Peening Cuts Stresses in Plated Parts. *Product Engineering,* v. 28, Dec. 9, 1957, p. 92-93.

The peening method pounds surfaces of high-strength steel with shot to neutralize stresses caused by electroplating, especially Cr plating. Peening also prevents cracks and increases fatigue life of parts. (G23n, L17; ST)

46-G. (German.) **Examination of Forming Processes With the Leyensetter Pendulum During the Removal of Metal.** Heinz Vogt. *Werkstatt und Betrieb,* v. 90, Nov. 1957, p. 776-784.

Cutting properties in relation to capacity for deformation, chip brittleness, structure and composition. 11 ref. (G17k, 2-60, 3-71; ST, CI)

47-G. (Russian.) **Investigation of the Effect of Carbide Irregularity on the Grindability of R18 Steel.** E. I. Feldshtein, N. P. Lebedinskii, I. V. Trush and V. S. Kazantsev. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 39-42.

Irregularity of carbide distribution affected not only the rate of metal removal but the finish of the surface as well. (G18, 17-52; SGA-j, 6-73)

48-G. Ceramic Cutting Tools. Pt. 1. J. F. Allen. *Canadian Metalworking,* v. 20, Oct. 1957, p. 24-26.

Experiences in using ceramic tools for finishing and roughing cuts on AISI 4130 and other forged steel. (To be concluded.) (G17; ST, SGA-j, 6-70)

49-G. Machining High-Temperature Alloys. A. B. Albrecht. *Machinery,* v. 64, Oct. 1957, p. 149-153.

High-temperature alloys are classified into ferritic, austenitic, age-hardenable and Co-base alloy groups. Composition, machinability ratings, recommended feeds and speeds, tool type and geometry for turning in roughing and finishing operations. Horsepower and coolant requirements for high-temperature alloys. (G17, G19; SGA-h)

50-G. Spark Erosion of Deep Holes on a Wickman Erodomatic Machine. *Machinery,* v. 91, Oct. 11, 1957, p. 867-870.

Features of spark machining technique used for producing long small-diameter holes in Nimonic alloys and heat resistant steels include hollow brass electrode through which dielectric fluid is pumped, rotation of electrode and controlled vibration of work table. (G24a; Ni, SS)

51-G. Forming Integrally Stiffened Wing Panels by Shot-Peening. Kenneth Sparling. *Machinery,* v. 91, Oct. 18, 1957, p. 903-906.

Cast steel shot propelled by high-velocity air jets against flat surface of integrally stiffened wing panels of 7075T6 Al to produce convex shape. (G23n, T24a; Al)

52-G. Rapid Production of Splines by Cold Rolling. M. Etzel and C. E. Kopp. *Machinery,* v. 91, Oct. 25, 1957, p. 961-962.

Cold forming of spline on outboard motor propeller shaft: advantages of process. (G11; ST)

53-G. Cold Extrusion of Steel. B. Kaul. *Machinery,* v. 91, Oct. 25, 1957, p. 963-968.

Developments in technique of forward and backward extrusion; typical shapes obtainable and various stages in production of a steel pressure tube. (G5; ST, 4-60)

54-G. A New Idea in Spark-Machining. James D. Shoemaker. *Machinery,* v. 64, Nov. 1957, p. 147-150.

Inverted electrode spindle and plastic bubble over work area containing dielectric coolant are features. (G24a)

55-G. Heavy-Duty Bending Is a Familiar Sight at Caterpillar Plant. A. W. Johnson. *Machinery,* v. 64, Nov. 1957, p. 158-159.

Plate bending. (G6, 4-53; ST)

56-G. Carbide Tooling and Single-Purpose Lathes Speed Machining of Forged Crankpins. *Machinery,* v. 64, Nov. 1957, p. 173-176.

Machining forged steel automobile crankshafts.
(G17, T6n, T21c; ST, 4-51)

57-G.* Thread Rolling May Be for You. Raymond H. Spiotta. *Machinery,* v. 64, Nov. 1957, p. 181-195.

Defines thread rolling, effects of rolling on mechanical properties, machines and dies for reciprocating flat die thread rolling, planetary thread rolling, in-feed or plunge rolling with cylindrical dies, attachments for thread rolling on screw machines and turret lathes, information on blank feeding, blank design and tolerances and production rates. (G12)

58-G. Use of "Throw-Away" Insert Tooling in Aircraft Production. W. L. Carr. *Machinery,* v. 91, Nov. 1, 1957, p. 1045-1047.

Throw-away carbide tips have advantages of lower costs and absence of heat strain as found in brazed tools. The use of carbide tips in turning, face, and side milling operations on Ti, Al and steel aircraft components.
(G17, T6n, 6-69; Ti, Al, ST)

59-G. AC Hydroforms Sample Stampings. T. C. Barrett. *Machinery,* v. 64, Dec. 1957, p. 144-149.
(G14b)

60-G. Oldsmobile's Rocket Engine Transfer Line. Charles H. Wick. *Machinery,* v. 64, Dec. 1957, p. 156-161.

Output has been increased by new automated transfer machining line. Slower operations have been made more efficient by dividing the work between several heads and machining alternate blocks at successive stations. (G17, 18-74, T2p)

61-G. Chrysler Automates New Stamping Plant. John Nieminen. *Machinery,* v. 64, Dec. 1957, p. 188-193.
(G3, T21; 18-67)

62-G.* Forces in Brake Forming. William W. Wood. *Tooling and Production,* v. 23, Oct. 1957, p. 77-84.

Theory of brake forming and general brake forming equation. Experimental determination of forces in forming steel, Al and Cu in gages of 0.051 and 0.125 in. Correlation of theory with experimental results.
(G1, 10-51)

63-G.* Cold Forming. William E. Hoffman and G. MacF. Tuttle. *Tooling and Production,* v. 23, Oct. 1957, p. 91-122.

Reviews definition, nature of process, principles, examples and possible applications of cold extrusion, impact extrusion, cold forging, cold heading, deep drawing, swaging and thread rolling. Principles of burnishing, roller burnishing, bearingizing, ballizing, ball-broaching, turks head, rolled extrusion, spinning, tube bending roll planishing, roll forming, stretch-wrap forming, shot peening and form and spline rolling.
(G general, 1-67)

64-G. Protective Shot Peening of Propellers. Pt. 3. Fatigue and Distortion. R. F. Broderick, Lesselles and Associates, Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131273, June 1957, 109 p. $2.75.
(G23n, T24b, Q7, 9-74)

65-G. (Dutch.) **Investigation and Trial of the Electric Gouging With Carbon Electrodes.** L. Clements. *Lastechniek,* v. 23, Sept. 1957, p. 200-203.

Flame-arc gouging offers advantages. Because of the rapidity of the gouging, the temperature of the workpiece is not appreciably increased but the cooling speed is rather high in the surface of the groove. This may result in surface hardening. (G22)

66-G. British Timken's Techniques in Grinding. Britain's Automatic Factory. Pt. 3. *Metalworking Production,* v. 101, Nov. 15, 1957, p. 2044-2047.

Grinding and handling methods illustrated and compared to bearing plants in America and Russia.
(G18, T7d, 18-74)

67-G.* Taking the Guesswork Out of Grinding and Polishing With Abrasive Belts. Warren K. Seward. *Plating,* v. 45, Jan. 1958, p. 39-44.

Tracking difficulties, contact wheels, mounting the contact wheel on worn spindles, truing and dressing contact wheels and rolls, new type of contact wheel, contact wheel performance, loading and glazing, lubrication of abrasive belts.
(G18, 1-52)

68-G. Making Metal Behave. Carl F. Benner. *Tooling and Production,* v. 23, Nov. 1957, p. 69-73.

Stamping plant experiences and procedure. (G3)

69-G.* Ironing to Improve Your Product and Save Metal, Time and Money. Carter. C. Higgins. *Tooling and Production,* v. 23, Nov. 1957, p. 77-81.

Defines ironing, a cold working process; possibilities and limitations.
(G4)

70-G. (Russian.) **The Soviet Machine-Tool Industry at the 40th Anniversary of the Russian Revolution.** *Stanki i Instrument,* v. 28, Oct. 1957, p. 1-3.
(G17)

71-G. (Russian.) **Thermal Range During Surface Grinding of Metals.** A. V. Podzei, N. N. Novikov and V. E. Loginov. *Stanki i Instrument,* v. 28, Oct. 1957, p. 16-17.
Analytical method for continuous recording of thermal range in cutting area during grinding. (G18, S16)

72-G. (Russian.) **Preparation of Multiple-Setting Screws by Rolling.** R. K. Duma. *Stanki i Instrument,* v. 28, Oct. 1957, p. 22-23.
Experiments in industrial use of rolling of multiple-setting screws have resulted in 200-fold increase in production. (G12)

73-G. (Russian.) **Calculation of Force Required for Grinding and Milling Gray Cast Iron.** Yu. A. Rozenberg and L. M. Sedokov. *Vestnik Mashinostroeniya,* v. 37, Dec. 1957, p. 68-71.
7 ref. (G18, G17b; CI)

74-G. (Russian.) **Cutter Cooling by Pressurized Liquid Jets.** S. S. Chetverikov and N. N. Zdrogov. *Vestnik Mashinostroeniya,* v. 37, Dec. 1957, p. 71-75.
(G17; NM-h)

75-G. How Grinding Affects Fatigue Strength. L. P. Tarasov. *American Machinist,* v. 101, Dec. 30, 1957, p. 72-74.
8 ref. (G18, Q7a; ST)

76-G. Secondary Broaching. Ty Miles. *Automatic Machining,* v. 19, Dec. 1957, p. 35-38.
Applications of broaching, a process being more widely used.
(G17d; ST)

77-G. Thread Rolling Fundamentals. Fred Nell. *Automatic Machining,* v. 19, Dec. 1957, p. 62-64.
(G12; ST)

78-G. Continuous Wheel Dressing Reduces Downtime in Production Grinding. *Canadian Metalworking,* v. 20, Dec. 1957, p. 18-19.
Technique involves two recent developments: perpetual form control of grinding wheels using form cutters and cemented diamond particles in powder metal cutter body.
(G18, G19, 1-61)

79-G. Results of Machining Research on Titanium Alloys. Kenneth Loo. *Machinery,* v. 91, Dec. 13, 1957, p. 1382-1386.
Tests made on two annealed plates of Rem-Cru C-110 M (AMS 4908) Ti alloy in connection with problems of producing large structural members for aircraft, including tapered skin panels. (G17, T24a, 17-57; Ti)

80-G. Turning Operations on High-Temperature Alloys. A. B. Albrecht. *Machinery,* v. 91, Dec. 20, 1957, p. 1431-1434.
(G17a; SGA-h)

81-G. Some Recent Developments in Ultrasonic Machining. *Machinery,* v. 91, Dec. 20, 1957, p. 1443-1444.
Kerry (Ultrasonics), Ltd., has developed a process for cutting internal and external screw threads by ultrasonic vibration. (G24c)

82-G. Quantity Production of Blades for Gas Turbine Compressors. E. Hugh Jones. *Machinery,* v. 91, Dec. 27, 1957, p. 1492-1496.
Methods and machinery for broaching Ti blades and grinding stainless steel blades.
(G17d, G18k, T7h; Ti, SS)

83-G. How to Improve Your Cylindrical Grinding. John A. Mueller. *Machinery,* v. 64, Jan. 1958, p. 129-133.
Basic factors that influence cylindrical grinding and experimental data showing how a change in factors alters end products.
(G18g, 17-52)

84-G. Broaching Internal Helical Gears. Frank Kirsten. *Machinery,* v. 64, Jan. 1958, p. 134-138.
(G17d, T7a; ST)

85-G. Aluminum Cans. *Materials in Design Engineering,* v. 47, Jan. 1958, p. 10-11.
Deep drawing, impact extrusion and conventional techniques.
(G4b, G5; Al)

86-G. Production Research in Metal Cutting. M. Eugene Merchant. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1137-1141.
Study of machining forces and tool wear. 5 ref. (G17, Q9, T6n)

87-G. And Now, Digital Flame Cutting! *Metalworking Production,* v. 101, Dec. 6, 1957, p. 2177-2179.
Computer-controlled flame cutting machine cuts time and costs in producing profiled plates for ship construction.
(G22g, W29d, 1-61, 18-74; ST)

88-G. Brake-Welder Team Form Stainless Pipe. *Modern Industrial Press,* v. 19, Dec. 1957, p. 23-24.
(G3n, K general, 4-60; SS)

89-G. Titanium Problem Licked by New Hot Spinning Process. *Modern Metals,* v. 13, Dec. 1957, p. 66-67.
(G13, 1-66, T24e; Ti)

90-G.* Titanium Forming. Bill Payne. *RPI Engineer,* v. 10, Jan. 1957, p. 20-23.
Experience with 6Al-4V Ti alloy; best conditions and methods for die, draw bench, roll, hammer, brake forming, spinning operations.
(G general; Ti)

91-G.* Modern Presswork Techniques. T. G. Woodward. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 803-812.
Important factors in design of experimental tooling and strip layout in developing sequence of operation and tools for multi-stage presswork. Technique creates components in strip material while retaining it in strip form in order to progress through various stages of the tools. (G1)

92-G. Need for Specific Sheet-Metal Testing Methods for Deep Drawing and Forming. G. de Witte. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 19-22.
(G4b, Q23q, S general, 4-53)

93-G. Ejection and Handling of Large Components in Pressworking. J. H. Stephens. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 23-34, 54.
Press layout, production costs, conveyors, loaders, the "iron hand", and automation equipment for various types of dies. (G1, W12)

94-G.* Photoetching Forms Thin Parts. *Steel,* v. 141, Nov. 18, 1957, p. 153-156.
Photoetching, in which patterns are printed on coated metal sheets and strips and unwanted portion etched away with acid used for accurately producing thin metal parts. Carbon and stainless steels, Cu, Ni and Al alloys are readily etched. Advantages of process. (G24b)

95-G.* Residual Stresses From Machining Operations. Pt. 1. Erik K. Henriksen. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 633-635, 639-640, 641.
Reviews literature on residual stresses produced by machining operations. Forces developed between tool chip and workpiece in the mechanism of stress formation. Machining stress data with single-point tools for carbon steels relating machining stress with rake angle and carbon content. Effect of speed and direction of cut on stress accumulation. (To be continued.) (G17, Q25h)

96-G. Cutting Material and Machining Costs With Power Roll Forming. E. W. Bartle. *Tool Engineer,* v. 39, Nov. 1957, p. 107-110.
Power roll forming is a cold rolling process in which material in a blank is caused to flow over rotating mandrel. Series 300 and 400 stainless steels, low-carbon steels, Ni, Ti and Al alloys successfully roll formed; application of process. (G11)

97-G. Solving Machining Problems With Chemical Milling. Arthur Colton. *Tool Engineer,* v. 40, Jan. 1958, p. 119-124.
(G24b)

98-G. Electrical Discharge Machining of Superalloy Turbine Rotor Blades. D. J. MacLean. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 77-82.
New method of working alloys above normal machining range.
(G24a, T2p; SGB-q)

99-G. Machinability of Cold Drawn Steel Bars. Fred J. Robbins. *Western Metalworking,* v. 15, Dec. 1957, p. 47-49.
Effects of machinability in both metallurgical and mechanical aspects. (G17k, Q general; 4-55, ST)

100-G. (German.) **Deep Drawing of Stainless Chromium and Chromium-Nickel Steels.** Georg Menges and Bernhard Vogelsang. *Industrie-Anzeiger,* v. 79, Aug. 27, 1957, p. 47-52.
Theoretical analysis supported by technical data. 10 ref.
(G4b; SS, *Cr, Ni*)

101-G. (German.) **Manufacture of Precision Slide Bearings.** *Technica,* v. 6, Aug. 16, 1957, p. 885-890.
Surface machining necessary to achieve the best characteristics for various bearings. (To be continued.) (G19, T7d)

102-G. (Italian.) **Cold Bending of Sheet.** P. I. Sandro Spiriti. *Macchine,* v. 12, Nov. 1957, p. 1111-1115.
Formulas for obtaining desired bends; examples. (G6, 4-53)

103-G. (French.) **Surface Phenomena in Drawing Steels Made in Openhearth and Electric Furnaces.** Maurice Vazelle. *Métaux, Corrosion, Industrie,* no. 385, Sept. 1957.
(G4; ST)

104-G. (German.) **Productivity and Economy in Metal Chipping.** E.

Hirschfeld. *Fertigungstechnik,* v. 7, Aug. 1957, p. 345-348.

Amount of surface machined; cutting speed; feed; suitable carbides. (G17, T6n; 6-69)

105-G. (German.) **Liquid Honing Under Pressure.** F. Neuberger, L. Mockel and L. Rötz. *Fertigungstechnik,* v. 7, Sept. 1957, p. 413-416.

Method is recommended for die finishing, scouring and polishing. 6 ref. (G19n, W24n)

106-G. (German.) **Use of Diamond Grinding Wheels.** *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 391-394.

Bonding; proper uses; handlapping. (G18, 1-52; NM-k37)

107-G. (German.) **Advantages and Disadvantages of Turning and Grinding the Grooves in the Rolls of Wire Rod Mills.** Torsten Palm and Hans Warrol. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 35-39.

Life of turned and ground rolls. Economic problems in machining rolls. (G17a, G18, W23k)

108-G. (Russian.) **Increase of Finishing Deformation Temperature as Means for Decreasing Load When Stamping Large Billets.** A. V. Altykis and N. I. Belan. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 48-52.

Temperature increase of the billet at the end of stamping from 850 to 1050° C. allows decrease of the load approximately by one half. (G3, 2-61; ST, 4-52)

109-G. (Russian.) **Production Problems of Automobile Sheet Steel for Deep Drawing.** G. D. Rogoza. *Stal',* v. 17, Oct. 1957, p. 941-943.

Non-aging killed steel is recommended for sheet making with sheet hardness control. 5 ref. (G4f, T21a; ST-c)

110-G. (Russian.) **Boring Heat Resistant Steel With Electropolished Bits.** V. V. Monakov. *Vestnik Mashinostroeniya,* v. 37, Sept. 1957, p. 46-47.

Effect of internal surface cleanliness of perforated heat resistant steel workpieces. 5 ref. (G17g, T6n; SS)

111-G. How to Machine Difficult Workpieces. Pt. 1. C. R. Stroup. *American Machinist,* v. 102, Jan. 13, 1958, p. 106-109.

Basic principles, operating techniques and latest advice on applications of electrolytic grinding. (G18, G24d)

112-G. Form Thick Titanium Spheres by Hot Spinning. *Iron Age,* v. 180, Dec. 5, 1957, p. 142-143.

(G13, 1-66, T24d; Ti)

113-G. Fast, Accurate Band Machining Avoids Chip Waste. *Iron Age,* v. 180, Dec. 26, 1957, p. 49-51.

Advantages of cutting, slotting, and shaping with band sawing machines. (G17h)

114-G. Forming Magnesium Skin Panels for Aircraft. H. F. Young. *Machinery,* v. 91, Nov. 8, 1957, p. 1105-1107.

(G4d, T24a, W24g; Mg)

115-G. Production of Aircraft Structural Shapes by Hot Stretching. B. Maloney. *Machinery,* v. 91, Nov. 8, 1957, p. 1107-1108.

(G9, T24a; Al)

116-G. Quantity Production of Fasteners. *Machinery,* v. 91, Nov. 22, 1957, p. 1214-1218.

Blanking, heading, pointing, thread-rolling, thread-grinding and hardening processes are employed in production of steel, brass and aluminum fasteners. (G general, T7f; ST, Al, Cu, *Zn*)

117-G. Production of Integrally-Stiffened Panels for the Vanguard Airliner. *Machinery,* v. 91, Nov. 29, 1957, p. 1244-1253.

Methods and equipment for pressing curvature, shot peening and milling panels. (G4d, G17b, G23n, T24a; Al)

118-G. Turning Operations on High-Temperature Alloys. A. B. Albrecht. *Machinery,* v. 91, Dec. 20, 1957, p. 1431-1434.

(G17a; SGA-h)

119-G. Some Recent Developments in Ultrasonic Machining. *Machinery,* v. 91, Dec. 20, 1958, p. 1443-1444.

Kerry (Ultrasonics), Ltd., has developed a process for cutting internal and external screw threads by ultrasonic vibration. (G24c)

120-G. Production Research in Metal Cutting. M. Eugene Merchant. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1137-1141.

Advantages of unified study of fundamental application of metallurgy, physics, dynamics, physical chemistry and engineering techniques and concepts of metal cutting research. 5 ref. (G17, A9m)

121-G. Inert-Gas Welding Gun Cuts, Then it Welds. *Metalworking,* v. 14, Jan. 1958, p. 3-5.

Trailer manufacturer finds method gives square cut edges at high speed. Eliminates preparation before welding Al plates and frame members. (G22, K1d, 1-52; Al)

122-G. Prestress Raises Steel Performance to New High. *Metalworking,* v. 14, Jan. 1958, p. 10-11.

Increased tensile strength and fatigue life of steel bomb rack hook used in jets.
(G23q, Q27a, Q7b, T2k; ST)

123-G.* Speed Effects in Deep Drawing. H. T. Coupland and D. V. Wilson. *Sheet Metal Industries,* v. 35, Feb. 1958, p. 85-103.

Effects of variations in drawing speed on performance in cup drawing using two distinct punch forms. Behavior of deep drawing quality mild steel and 70-30 brass. Lubricants have been confined to a series of mineral oils and colloidal graphite. (G4b; CN, Cu-n, NM-h)

124-G. Short Run Dies Offer Long Life. *Steel,* v. 141, Dec. 2, 1957, p. 94-96.

Advantages of low-cost dies for blanking, punching, piercing and forming operations. (G3, W24n)

125-G. Chem-Milling Handles Tough Job. *Steel,* v. 141, Dec. 2, 1957, p. 114.

Controlled chemical milling produces complex parts. (G24b, T24a)

126-G. Electrolytic Machining Handles Tough Alloys. *Steel,* v. 141, Dec. 9, 1957, p. 196-200.

(G24d; Co, Ni, SS)

127-G. Case of Molybdenum Disulfide. Harry Simon. *Steel,* v. 141, Dec. 30, 1957, p. 68-69.

Molybdenum disulphide used as a lubricant in tight-fitting assemblies and for lubricating hot drawing and forming dies. (G1, G4, Q9; Mo, NM-h)

128-G. In-Plant "Diamond Mines" Are Expensive—Spot Yours and Save. Carol E. Reuss. *Tooling and Production,* v. 23, Feb. 1958, p. 67-78.

Comprehensive guide to the basic principles of abrasive and diamond wheels; optimum feeds and speeds; comparison with electrolytic, electrospark and ultrasonic grinding; diamond salvage techniques; applications of finish to carbide tools. (G18, 1-52; NM-k37)

129-G. A Cold Answer to Some "Hot" Metal Problems. C. E. Ricketts. *Tooling and Production,* v. 23, Jan. 1958, p. 78-81.

A new high-frequency impact-spin technique for cold dimpling of superalloys. Advantages compared to conventional ram-type dimpling process. (G3, 1-67; Ti, SGA-h)

130-G. Carbide Milling of Steel on Low-Horsepower Machines. Raymond E. Novkov and William B. Stein. *Tooling and Production,* v. 23, Feb. 1958, p. 83-87.

Relative horsepower requirements for various chip loads. (G17b, W25r)

131-G. Factors That Affect the Performance of Coated Abrasives. S. L. Johnson. *Tooling and Production,* v. 23, Jan. 1958, p. 87-90.

Effects of speed, contact, wheel shape and hardness, grit size and type and grinding pressure on the finish obtained with abrasive belt grinding. (G18, 1-52; NM-j)

132-G. Subzero Temperatures Facilitate Production Processes. Robert A. Wason. *Tool Engineer,* v. 40, Feb. 1958, p. 107-115.

Chilling workpieces or coolants reduces cutting time, facilitates machining and improves tool life. New techniques can stabilize and improve metallurgical properties, are valuable also in processing rubber and plastics. (G17, 1-67, 2-63)

133-G. Modern Tube Bending Equipment. G. E. Hart. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 392-393.

Fundamental forms of tube bending equipment including forming dies, clamps and mandrels.
(G6, 1-52; 4-60)

134-G. Grinding Wheels for Aluminum. Arthur T. Dalton. *Welding Engineer,* v. 43, Feb. 1958, p. 44.

(G18; 1-52; Al)

135-G. (French.) Technology of Cold Forming of Metals. Pt. 2. R. Molle. *Metallurgie et la Construction Mécanique,* v. 89, Dec. 1957, p. 1021-1027.

Roll forming, deep drawing: techniques, equipment, applications. (Concluded.) (G4b, G11)

136-G.* (French.) Machinability of Steels. E. Bodart. *Revue de la Mécanique,* v. 3, Oct. 1957, p. 125-139.

Methods of determining machinability; measurement of tool life gives results most directly transposable to shop; experimental results obtained by tool life method. No simple correlation is found between any given steel manufacturing process or condition and machinability. 11 ref. (G17k; ST)

137-G. (German.) Features of Development of the Superfinishing Process. K. Wieck. *Das Industrieblatt,* v. 57, Aug. 1957, p. 396-399.

Development of oscillating superfinishing machines. (G19q, 1-52)

138-G. (German.) **Electro-Erosion Apparatus.** G. Barna. *Fertigungstechnik,* v. 7, Dec. 1957, p. 543-549.

Some theories on electro-erosion; design variants in apparatus, their advantages and disadvantages; technology of hard metal coating. (G24a, 1-52, L24)

139-G. (German.) **Scraping of Tooth Profiles. Pt. 2.** G. Rippin and H. Theumer. *Fertigungstechnik,* v. 7, Dec. 1957, p. 569-572.

Experiments with milling and scraping; scraping improves toothwork whereas grinding can interfere; control and the importance of coolants. (G17b; NM-h)

140-G. (Japanese.) **Study on High-Speed Machining. Pt. 8. Effect on Tool-Chip Contact Area on Tool Life.** Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory,* v. 11, Nov. 1957, p. 185-188.

At the optimum tool-chip contact area per unit area of cut, the cutting speed can be increased up to 140%. 6 ref. (G17, 3-68)

141-G. (Japanese.) **Study on High-Speed Machining. Pt. 9. Effect of Tool Cutting Conditions on Machining Performance.** Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory,* v. 11, Nov. 1957, p. 189-193.

Variation of tool-chip contact area is independent of coefficient of friction of rake face. The contact area is influenced by the metallic affinity between the rake face and the chip. (G17, Q9p)

142-G. (Swedish.) **Turning or Grinding Roll Grooves.** Torsten Palm. *Jernkontorets Annaler,* v. 141, Nov. 1957, p. 790-797.

From point of view of rolling time before rejection there is no difference between turning and grinding of roll grooves on chilled rolls. (G17a, G18, W23k; ST)

143-G. (Swedish.) **Chemical Treatment of Metals.** *Teknisk Tidskrift,* v. 87, Oct. 8, 1957, p. 839-842.

Chemical cutting and punching method; preparation, masking, etching and post-treatment. Economic aspects. 5 ref. (G24b; Al)

144-G. Production Research in Metal Cutting. M. Eugene Merchant. *ASME Paper 57-A-99,* Dec. 1957, 5 p.

Basic method for securing production results in metal-cutting research through unified scientific and engineering approach. 5 ref. (G17, A9)

145-G. Machinability of High-Strength Gray Cast Irons. I. Ham, J. R. Roubik and J. P. Bunce. *ASME Paper No. 57-A-239,* Dec. 1957, 12 p.

11 ref. (G17k; CI-c)

146-G. Roll Forming—Chipless Production. K. W. Stalker. *ASME Paper No. 57-A-271,* Dec. 1957, 9 p.

Cold-forming process for making cylindrical and conical parts. Processing variables and examples of products. (G11, 1-67)

147-G. Chemical Milling of Magnesium. Hugh H. Muller. *Machine Design,* v. 30, Jan. 9, 1958, p. 137-138. (G24b; Mg)

148-G. Aircraft Manufacturing Practice. Pt. 2. A Review of the British Industry. L. G. Burnard. *Machinery,* v. 92, Jan. 10, 1958, p. 97-106.

Pipe bending, sheet metal forming, chemical milling, honeycomb brazing. (G1, G6, G24b, K8, T24)

149-G. New Spark-Machining Technique. J. D. Shoemaker. *Machinery,* v. 92, Jan. 10, 1958, p. 74-76.

Lockheed Aircraft Corp.'s method for finishing cavities of impact extrusion dies. Inverting electrode needle gives rigidity, and coolant flowing in opposite direction of electrode increases machinery speed and improves finish. (G24a, W24n)

150-G. How to Fabricate Stainless Steels. Pt. 1. W. E. McFee. *Metal Products Manufacturing,* v. 15, Jan. 1958, p. 33-35, 68.

Fabrication of various grades, good die practice, die lubricants, annealing, roll forming, spinning, cutting and shearing. (G-general, J23; SS)

151-G. Cutting Fluid Selection. *Metal Progress,* v. 73, Feb. 1958, p. 102-103.

Factors considered include metal to be cut, tool material used, type of operation, quantity of production and cost. (G17, NM-h)

152-G. How to Cut Stamping Costs. *Steel,* v. 142, Feb. 3, 1958, p. 122-124.

Designing for standard practices and tolerances. (G3, 17-51, 17-55)

153-G. (Russian.) **Threading Tubes With Round Screw Dies.** I. A. Gurin. *Metallurg,* Dec. 1957, p. 31.

Semi-automatic machines for threading oil pipes, 6-13 in. diameter, equipped with special conical chuck. (G17f, 1-52, 4-60)

154-G. Behavior of Cutting Fluids in Reaming Steels. L. V. Colwell and Henrik Branders. *American Society*

of Mechanical Engineers, Paper no. 57-A—168, Dec. 1957, 5 p.

(G17e; ST, NM-h)

155-G. Use of Shot Peening to Reduce Weight. W. R. Berry. *Institution of Mechanical Engineers, Proceedings of the Automobile Division*, no. 7, 1955-1956, p. 219-232.

Study of fatigue properties in the finite life range of the commercial silico-manganese spring steel leaves in the normal and shot-peened conditions so as to consider possibility of employing shot-peening as a means of using higher calculated stresses in laminated spring design, thus reducing weight of springs. 5 ref. (G23n, Q7; AY, *Si, Mn*, SGA-b)

156-G. Automatic Flame Profiling of Steel Plate. *Process Control and Automation*, v. 5, Jan. 1958, p. 22-24.

Experimental computer-controlled cutting machine, using magnetic tape input. (G22g; ST, 18-74)

157-G. Chem-Milling Comes of Age. Raymond L. Lewis. *Wisconsin Engineer*, v. 62, Dec. 1957, p. 30-32, 74.

(G24b)

158-G.* (French.) **Oxy-Acetylene Cutting of A52 Steels.** W. Soete and E. Sellier. *Revue de la Soudure*, v. 13, no. 4, 1957, p. 214-226.

Oxy-acetylene cutting of six A52 steels (in thicknesses of 8 to 25 mm.) caused no defects in cut edges. Process hardens the metal. No post-cutting treatment is required prior to welding. Ductility of cut edges is lower than that of metal before cutting, and a pre or post-heating by torch improves ductility. Where a cut edge is to be subjected to strenuous cold deformation, a grinding operation to remove from 1.0 to 1.5 mm. of material is recommended. (G22g, Q23p; AY)

159-G. One Ball, No Errors. *Automatic Machining*, v. 19, Feb. 1958, p. 40-42.

Ballizing process with precision balls of tungsten carbide and chromium alloy steel is solution for hole size and finishing problems.
(G17d, G23n, 1-52; AY, W, 6-69)

160-G. How to Get More From Your High Production Machines. Harry Conn. *Machine and Tool Blue Book*, v. 53, Feb. 1958, p. 113-135.

Concept of "optimation" combines economics, metal cutting research and tool engineering to compute minimum cost, tool life, optimum speeds and feeds, and reduce down time due to tool changes.
(G17, T6n, W25)

161-G. Today They Grind Titanium Routinely. D. S. Foote. *Machine and Tool Blue Book*, v. 53, Feb. 1958, p. 136-140.

(G18; Ti)

162-G. Growing Versatility of Ultrasonic Machining. Jack Welch. *Machinery*, v. 64, Feb. 1958, p. 119-123.

Most successful with harder, more brittle materials difficult to machine by other methods, such as carbide, ferrite, ferramic. Useful in manufacture of dies for type and tread designs for automobile tire molds; machining gem stones; hand engraving; slicing and dicing of Si and Ge for transistors and diodes. (G24c)

163-G. Practical Tooling for Cold Extrusion. Pt. 1. Special Report. John Verson. *Metalworking Production*, v. 102, Jan. 17, 1958, p. 105-113.

Factors for successful impact extrusion of steel; tool design, capacity of press, quality of material, lubrication and shape of slug, knowledge of metal flow. (G5, 1-52, ST)

164-G. Bending Machines Form Precision Parts. *Steel*, v. 142, Feb. 10, 1958, p. 79-82.

Various machines bend thin or heavy wall tubes, intricately flanged extrusions and other shapes to tight radii without wrinkling, bursting or distortion. (G6, 1-52; ST)

165-G.* (German.) **Ceramic Tools for Machining.** H. Opitz and H. Siebel. *Werkstattstechnik*, v. 48, Jan. 1958, p. 2-6.

Applications of ceramic cutting tools in working steel and cast iron. Advantages of some ceramic types in comparison with hard metal, especially in machining gray cast iron. (G17; SGA-j, Al, 6-70)

166-G. (Italian.) **Metallurgy and Machinability of Steels.** Ferruccio Grandi and Athos Masi. *Ingegneria Meccanica*, v. 6, Nov. 1957, p. 17-24.

Influence of hardness, mechanical properties, microstructure, composition, austenitic grain size, heat treatment and cold work on machinability. (To be continued.)
(G17k; ST)

167-G.* Hot Forming Operations on Titanium. *Australasian Manufacturer*, v. 42, Jan. 11, 1958, p. 44-47.

Intricate contours and small-radius bends can be formed. The key to successful processing is controlled heating to temperatures from 300 to 1400° F., depending on the shape of

the finished workpiece and the forming method employed. Individual heating blocks may be used to raise the temperature of the work by a few hundred degrees, or the work itself serves as a resistance heating element and is brought to a red heat. (G1, G9, 1-66; Ti)

168-G. Material Selection for Thread and Form Rolling. *Machine Design,* v. 30, Jan. 23, 1958, p. 137-143.

Rollability and machinability of carbon and alloy steels; nonferrous alloys, Al and Al alloys; finishes obtainable on threaded parts.
(G11, G12, G17k, 17-52; ST, Al)

169-G. Carbide Tools of Special Form for Interrupted Cutting. M. G. Jensen. *Machinery,* v. 92, Jan. 3, 1958, p. 17-18.

Alteration of the normal tool form to include a positive top rake in conjunction with an edge chamfer resulted in satisfactory work finish, accuracy and a saving of time, by comparison with alternative methods of turning with high-speed steel or circular milling.
(G17a, G17b, T6n; 6-69)

170-G. Turbine Blades Reclaimed by Electrolytic Grinding. E. W. Denison and C. V. Ruehrwein. *Machinery,* v. 92, Jan. 3, 1958, p. 31-32.

Cracks on the root flat of turbine blade dovetails have been removed, without altering the depth of penetration, by the electrolytic grinding process using a surface grinder with a 150-grit diamond electrode wheel and electronic control equipment.
(G18, T7h)

171-G. Aircraft Manufacturing Practice—a Review of the British Industry. L. G. Burnard. *Machinery,* v. 92, Jan. 3, 1958, p. 37-47.

Types of routing machines and their applications, including three-dimensional contouring of integrally stiffened forms; wing skin milling; machining of high-tensile steels, Ti, etc., with results obtained using Strasman cutters; systems of numerical control for machine tools.
(G17, T24a)

172-G. (Italian.) **Coining.** Franco Peruzzoti. *Rivista di Meccanica,* Jan. 21, 1957, p. 9-13.

Process; ferrous metals that can be successfully coined; machines used (fly press, toggle press); die design and specifications.
(G3n, 1-52; CI, ST)

173-G. (Book.) **Metal Cutting Tool Nomenclature.** 107 p. 1958. Metal Cutting Tool Institute, 405 Lexington Ave., New York 17, N. Y. $4.50.

Definitions, illustrations and nomenclature arranged by classification. (G17, T6n, 11-67)

174-G.* Chemical Milling: Where and How. Pt. 1. Where to Use Chemical Milling. Jay Sullivan. *American Machinist,* v. 102, Mar. 24, 1958, p. 122-124.

Application of chemical milling outside of aircraft industry. Al, Ti, Mg and steel alloys may be milled by chemical solutions.
(G24b; Al, Ti, Mg, ST)

175-G.* Chemical Milling: Where and How. Pt. 2. How to do Chemical Milling. Ken Clark. *American Machinist,* v. 102, Mar. 24, 1958, p. 125-127.

Procedure for etching Al airplane wing-tip panels. Rate of etching depends on direction of grain, alloy, previous heat treatment, time, temperature, agitation, angle of immersion and spacing of parts in the bath. (G24b; Al)

176-G. How to Get the Best From Ceramics. H. D. Moore and D. R. Kibbey. *Canadian Machinery,* v. 69, Jan. 1958, p. 65-66, 126-127.

(To be continued.)
(G17, T6n; 6-70)

177-G. Computer Controlled Flame Profiling of Steel Plate. *Industrial Finishing,* v. 10, Feb. 1958, p. 33.

(G22g, 4-53; ST)

178-G. Where Do We Stand With Metalcutting Research. M. Eugene Merchant and Paul A. Meline. *Machine and Tool Blue Book,* v. 53, Feb. 1958, p. 103-109.

Machinability testing and sound engineering principles must be combined to solve problems and control rising costs of machining high-strength metals. Tool wear more important than tool life. Automated lines, quicker change of work piece and cutter are economically important as metal is removed at faster rates. (G17, 17-52, A9n)

179-G. There's a Big Future for Impact Extrusion of Steel. H. W. Byles. *Metalworking Production,* v. 102, Jan. 31, 1958, p. 201-203.

(G5; ST)

180-G. Shop Design for Contour Machining. Gilbert C. Close. *Modern Machine Shop,* v. 30, Feb. 1958, p. 102-107.

(G17c)

181-G. Machining Metal Honeycombs. Thomas A. Dickinson. *Mod-*

ern Machine Shop, v. 30, Feb. 1958, p. 108-109.

Electrical discharge methods allow machining of Al, stainless steel and Ti honeycombs to 1.0005 tolerances. (G24a, 7-59; SS, Ti)

182-G. Surface Grinding to Order. John E. Hyler. *Modern Machine Shop,* v. 30, Feb. 1958, p. 124-127.

(G18k)

183-G.* Chem-Mill: Shortcut to Hard-to-Machine Magnesium Parts. Hugh H. Muller. *Modern Metals,* v. 14, Feb. 1958, p. 62-65.

A simple chemical etch method reduces weight of Mg parts, allows simpler forming, and reduces reject rate, without affecting physical properties. (G24b; Mg)

184-G. Subzero Processing. John Starr. *Pacific Factory,* v. 89, Jan. 1958, p. 22-24.

Dimensional stability and machinability of cast and wrought forms of Al and Mg alloys can be improved by cold treatment. The low-temperature exposure and over-aging not only improve stability but accelerate structural changes that might take place in service. Thus dimensional deviations can be detected and corrected while materials are being fabricated.
(G17, J27d, 2-63; Al, Mg)

185-G.* Chemical Milling. C. H. Lundquist. *Product Engineering,* v. 29, Feb. 3, 1958, p. 50-53.

Procedures and applications.
(G24a)

186-G. Explosive Forming. William Edwards. *Production,* v. 41, Feb. 1958, p. 61-63.

(G1, G4, G14b)

187-G. (English.) **Experimental Study on Machining of Pearlite Cast Iron.** Keiji Okushima and Kiyoshi Minato. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 669-674.

Fine boring with jig borer; the best cutting conditions were determined from roughness of machined surface and the cutter wear. Several kinds of tungsten carbide tools were tested. (G17d; CI)

188-G. (German.) **Electro-Erosion Machining in Hungary.** K. Wittmann. *Fertigungstechnik,* v. 7, Nov. 1957, p. 532-535.

Description of Hungarian plants; advantages of the process. (G24a)

189-G. (German.) **Application of Oxygen Lance Using Steel Wire or Flux Powder.** H. Jansen. *Schweissen und Schneiden,* v. 10, Jan. 1958, p. 20-26.

6 ref. (G22g)

190-G. (German.) **Methods of Machining.** Kurt R. Pawlowitz. *Technik und Betrieb,* v. 9, Sept. 1957, p. 131-134.

A survey of methods, materials and tools for machining metals with special consideration of milling and turning. (G17a, G17b, W25)

191-G. (Japanese.) **Cutting Mechanism of Soft Metals.** Keiji Okushima and Katsundo Hitomi. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 674-680.

Dry cutting of soft metals such as lead at low speed. 6 ref. (G17; Pb)

192-G. (Japanese.) **Failure of High-Speed Steel Tools on Cutting of Mild Steel.** Keiji Okushima and Nobii Osaka. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 680-683.

By cutting mild steel with a specially designed tool, the process of wear was investigated, especially flank wear, crater wear, the tool contour at the end of tool service, and the effect of cutting conditions. (G17, Q9, T6n, 17-57; ST, TS)

193-G. (Japanese.) **New Method of Cold Extrusion of Steel.** Mahito Kunogi. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 742-749.

As a result of experimental studies on the effects of tool shape, extrusion speed and heat treatment of work materials, the extrusion pressure in this method is reduced by about 40%. 11 ref. (G5; ST)

194-G. (Japanese.) **Cold Extrusion of Alloy Steels.** Mahito Kunogi. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 749-756.

The new method has been successfully applied to a wide variety of steels, such as structural steel, nitriding steel, special toolsteel, bearing steel and austenitic stainless steel. 15 ref. (G5; ST, SS, TS)

195-G. (Japanese.) **Plate Pressing.** Yasuo Kasugo. *Metals,* v. 27, Dec. 1957, p. 934-938.

(G1; 4-53)

196-G. Explosives Become Portable Power Packs. Annesta R. Gardner. *Product Engineering,* Jan. 6, 1958, p. 56-60.

Baby rockets are proposed for use in varied applications, including

forming of metals such as Ti and stainless, which are difficult to shape by usual methods. (G23; Ti, SS)

197-G. Suggestions on Designing for Machining Heat Resistant Alloys. R. D. Halverstadt. *Steel Processing and Conversion,* v. 44, Mar. 1958, p. 141-149, 164.

Tendency of heat resistant alloys to work harden rapidly, rapid tool dulling, and high cutting forces necessary require consideration in design of parts made of these alloys. 9 ref. (G17; SGA-h, SS)

198-G. Automatic Flame Profiling of Plate in Shipyard Practice. W. H. Pearse and R. R. Sillifant. *Welding and Metal Fabrication,* v. 25, Dec. 1957, p. 461-468.

System utilizing heat control and programming for profiling ships' plate with oxygen cutting nozzles. 11 ref. (G22g, T22; 4-53)

199-G.* New Technique Makes No-Draft Pressing Possible, Economical and Practical. Collins Fuqua. Paper from "Magnesium in Perspective", Magnesium Association, p. 301-305.

Pressing instead of forging blanks of Mg alloy produces improved grain flow, highly accurate dimensions, conserves material, reduces machining. (G1; Mg)

200-G. (German.) Principles of Metal Spinning. R. Beck and H. Gross. *Fertigungstechnik,* v. 7, Oct. 1957, p. 461-464.

Semi or full automation keeps metal spinning up to date and economical in production for shaping of symmetrical circular articles. Equipment and operation. 9 ref. (G13)

201-G. Titanium Is Roll-Formed Hot. *American Machinist,* v. 102, Feb. 24, 1958, p. 111.

(G11, T24, 2-62; Ti-b)

202-G. Flame Cutters Trace Fast Patterns. *Iron Age,* v. 181, Feb. 6, 1958, p. 110.

(G22g; ST)

203-G.* Metallography Solves a Tough Machining Problem. A. J. Belli. *Iron Age,* v. 181, Feb. 20, 1958, p. 96-98.

Machinability of drilling operation varied in wear-resistant, iron-base alloy castings for engine valve-guides. Analysis that combines routine hardness measurements with conventional metallography shows the predominance of a particular structure mostly affecting machinability. Since these structures of primary carbides will not respond to heat treating, the quantity must be controlled in the casting operations where they are formed. (G17k, M27; ST, SGA-m)

204-G. How Cold Hobbing Shapes Intricate Parts. Alex Phillips. *Iron Age,* v. 181, Apr. 3, 1958, p. 91-93.

(G17b, 1-67)

205-G. Aluminum Impacts Open New Areas for Design. E. J. Egan, Jr. *Iron Age,* v. 181, Apr. 3, 1958, p. 98-100.

Applicaion of impact extrusion. (G5, 17-51; Al-b)

206-G. Tips on Spinning Stainless Parts. *Iron Age,* v. 181, Apr. 3, 1958, p. 101-103.

(G13; SS)

207-G. Learn to Work Sheet Metal the Low-Cost Way. *Iron Age,* v. 181, Apr. 10, 1958, p. 104-105.

Stretch forming, Guerin trapped rubber forming, metal spinning, power roll forming. (G9, G11, G13, G14)

208-G.* Compressive Deformation as a Means of Effecting Stress Relief in Aluminum Forgings. R. E. Kleint and Frank G. Janney. *Light Metal Age,* v. 16, Feb. 1958, p. 14-21.

Mechanism of compressive deformation to relieve residual stresses in 7075 and 2014 Al alloy forgings. Dimensional stability and mechanical properties of specimens stress-relieved by different percentages of compressive deformation and with alloys in T6 or W heat treat conditions. (G23, Q25h, Al, 4-51)

209-G.* Changeover Progressive Dies Cut Costs on Short-Run Jobs. *Metalworking,* v. 14, Mar. 1958, p. 8-9.

Five-station progressive dies are used for forming picture-tube supports in two different lengths. Movable inserts and stock guides permit stamping these in same set of dies. (G3, W24n, 1-52)

210-G. (English.) Drawing of Sheet Through Rotation Roll. H. Yamanouchi and I. Hayashi. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 63-66.

Drawing of sheet by forward tension. Drawing forces and roll pressures theoretically formulated and compared with experimental values. (G11, 4-53)

211-G. (Russian.) Technology of Disk, Rotor and Ring Stamping. I. S. Kvater. *Vestnik Mashinostroeniya,* v. 38, Jan. 1958, p. 48-53.

(G3)

212-G. (Russian.) **Theory of Drawing of Intricate Shapes.** A. D. Tomlenov. *Vestnik Mashinostroeniya,* v. 38, Jan. 1958, p. 53-56.

8 ref. (G4, 3-73)

213-G. **Quick-Frozen Water Clamps Honeycomb for Machining.** H. H. Powell. *American Machinist,* v. 102, Feb. 24, 1958, p. 102-103.

(G17, G24, W25r, 7-59)

214-G. **Where Stainless Is Lighter Than Aluminum.** James B. Teeter and Rod Rohrberg. *American Machinist,* v. 102, Mar. 10, 1958, p. 132-133.

Clamshell, "anti-ice", stainless steel nozzles are formed in halves of a drop-hammer press and then welded together. Stainless steel replaces Al in this process, reducing fabricating costs 27% and cutting weight 50%.
(G14, T24, 17-57; Al, SS)

215-G. **How to Machine Beryllium.** D. R. Walker and J. Gubas. *American Machinist,* v. 102, Apr. 21, 1958, p. 129-131.

(G17; Be)

216-G. **Gears Hard-Hobbed to Bypass Heat Treat Distortion.** M. E. Samuelson. *American Machinist,* v. 102, Apr. 21, 1958, p. 142-144.

(G17b, T7a; ST, 9-74)

217-G. **Drilling Small Holes by the Ultrasonic Method.** N. K. Marshall. *Machinery,* v. 92, Feb. 14, 1958, p. 379-380.

Drilling 0.015-in. diameter holes in ferrite cores. (G24c)

218-G. **Machining Crankshafts With Carbide Tools on Single-Purpose Lathes.** *Machinery (London),* v. 92, Feb. 21, 1958, p. 443-444.

(G17a, T21c, T6n)

219-G. **Cold Working of Metals at Ford.** D. J. Davis. Digest of paper for Society of Automotive Engineers, Feb. 17, 1958. *Metal Progress,* v. 73, Apr. 1958, p. 132-138.

Cold extrusion of small parts improves product quality, reduces stock requirements, cuts cost and permits closer dimensional control than methods formerly used. (G5)

220-G. **An Easier Way to Find Best Cutting Speed.** H. J. Siekman. *Metalworking Production,* v. 102, Feb. 28, 1958, p. 365-368.

Optimum cutting speeds can be represented graphically as a range on a chart. Formulas and worksheet permit easy calculation of limits of high efficiency range without constructing curves. (G17, 3-67)

221-G.* **Applications of Electrolytic Grinding. Pt. 1.** C. R. Stroup. *Metalworking Production,* v. 102, Feb. 28, 1958, p. 370-373.

An electrically conductive, metal-bonded wheel impregnated with abrasive is required. Machining hard or refractory materials is the primary application, but the electrolytic principle can be applied to grinding with diamonds, carbide cutting tools, wear strips and dies, as well as Ni and Ti. Stainless steel, stainless steel honeycomb and high-alloy steels can be ground to burr-free finishes. Form grinding is improved and segments for lamination dies can be ground from solid blanks. (G18, G24d)

222-G. **Ceramics Complement, Not Supersede, Carbides.** *Metalworking Production,* v. 102, Apr. 4, 1958, p. 604-605.

(G17, T6n; 6-69, 6-70)

223-G. **Use of Explosive Charges for Forming Sheet Metal. A Report of Some Experimental Work in the U. S. A.** Thomas A. Dickinson. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 213-215.

(G1, 4-53)

224-G. **Are These Tomorrow's Machining Speeds?** *Steel,* v. 142, Apr. 14, 1958, p. 138-140.

Workpiece is shot out of a rifle and grazes cutting tool at speeds as high as 162,000 surface ft. per min. (G17)

225-G. (German.) **Automation in Grinding and Polishing.** W. Burkart and O. Friedrich. *Industrieblatt,* v. 58, Feb. 1958, p. 35-37.

Review of modern equipment.
(G18, L10b, 1-52)

226-G. (German.) **Advantages of Centerless Fine Honing Machines in Machining of Cylindrical Pieces.** Ernst Thielenhaus. *Industrieblatt,* v. 58, Feb. 1958, p. 37-40.

(G19n, G19q)

227-G. (German.) **Blast Lapping.** Gert Dickoré. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 12-13.

(G19n)

228-G. (German.) **Precision Turning and Boring.** Alfons Gerson. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 13-18.

8 ref. (G17a, G17d)

229-G. (German.) **Precision Grinding and Surface Grinding.** R. Blohm. *Technische Mitteilungen,* v. 50, Jan.

1957, p. 18-20.
(G18, G19)

230-G. (German.) **Precision Planing, Milling and Reaming.** O. Steppat. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 20-24.
7 ref. (G17b, G17c, G17e)

231-G. (German.) **Use of Ultrasonics in Machining.** W. Lehfeldt. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 28-30.
(G24c)

232-G. (German.) **Electric Machining.** G. Koschalke. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 31-35.
7 ref. (G24a)

233-G. (German.) **Precision Forming.** J. Goldsche. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 45-48.
(G4)

234-G. (Russian.) **Machining Hard Metals With Electric Conductive Abrasives.** I. K. Trushin. *Vestnik Mashinostroeniya,* Feb. 1958, p. 51-53.
(G24; EG-d)

235-G. (Russian.) **Effect of Cold Drawing on Surface of Titanium Alloys.** N. F. Pronkin. *Vestnik Mashinostroeniya,* Feb. 1958, p. 53-54.
(G4; Ti-b)

236-G. Blanking and Forming Titanium. W. A. Mays and G. J. Matey. *Aircraft Production,* v. 20, Feb. 1958, p. 52-60.
(G2h, G4, T24; Ti-b)

237-G. Machining Ultra-High-Tensile Steels. H. J. Pearson. *Aircraft Production,* v. 20, Feb. 1958, p. 75-83.
Evaluation of machinability and conditions of operation for turning and milling operations.
(G17; ST, SGB-a)

238-G. Automatic Tape Control Slashes Milling Bottlenecks. *Iron Age,* v. 181, Apr. 17, 1958, p. 103-105.
(G17b, W25r; 18-74)

239-G.* Property of Free Machining. Effects of Sulphur and Lead. K. G. Lewis. *Iron and Steel,* v. 31, Apr. 1958, p. 133-140.
Chip formation in resulphurized and leaded steels; free-machining properties obtained by sulphite treatment (as opposed to sulphur or sulphide additions); machinability of alloy steels and nonferrous alloys containing sulphur-type additions and/or other free-machining additives; effect of lead additions on machinability of steels; effect of sulphur additions on toolsteels. 47 ref. (G17k, 2-60; AY, TS)

240-G. Working Titanium . . . Recent American Developments. *Light Metals,* v. 21, Apr. 1958, p. 116-118.
(G-general; Ti)

241-G. Shot Peening. H. O. Fuchs and E. R. Hutchinson. *Machine Design,* v. 30, Feb. 6, 1958, p. 116-125.
The process, application, effects, how and where to use it. 23 ref. (G23n)

242-G. How to Fabricate Stainless Steels. Pt. 2. W. E. McFee. *Metal Products Manufacturing,* v. 15, Feb. 1958, p. 19-22.
Fabrication of various grades, good die practice, die lubricants, annealing, roll forming, spinning, cutting and shearing. (G-general; SS)

243-G.* Forgings and Machinability. G. H. Jackson. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 91-95.
Factors affecting machinability of drop forgings are composition and heat treatment. Small quantities of boron (0.0005%), and Ni and Cr (less than 5%) influence strength of ferrite. Nonmetallic inclusions. Manganese sulphide provides internal lubrication during cutting. Consistency of heat treatment should be maintained for uniform machining characteristics, grain size, crystallographic orientation; distribution affects heat treatment results.
(G17k, 2-60, 2-64; ST, 4-51)

244-G. Impact Extrusion. H. W. Byles. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 107-110.
Three methods of impact extrusion are backward extrusion, where the metal flows in the opposite direction to the movement of the punch; forward extrusion, where the metal flows in the same direction as the punch; and a combination of the two, where extrusion takes place in both directions. (G5)

245-G. Impact Extrusion With 32-to-1 Ratio. John R. Saul. *Metalworking Production,* v. 102, Feb. 21, 1958, p. 317-319.
(G4, 4-60, T2p)

246-G.* Design for Chemical Milling. Jay Sullivan. *Modern Metals,* v. 14, Apr. 1958, p. 54-62.
Chemical milling permits forming of parts impossible to machine, reduces weight of components. Cost factors in masking and patternmaking, capabilities and limitations of process. (G24b, 17-51)

247-G.* **Two Ways to Machine Titanium Honeycomb.** Allen C. Gilbrath. *Modern Metals,* v. 14, Apr. 1958, p. 78.

Honeycomb can be machined to tolerance of 0.0005 in. by filling with water and freezing beforehand. It can then be machined like a solid block. The other method uses a phenolic or Al sheet cemented to the bottom, and a vacuum chuck to hold the piece in place. (G17; Ti, 7-59)

248-G. **Abrasive Belts Cut Roll Grinding Costs.** *Steel,* v. 142, Mar. 31, 1958, p. 92, 94.

(G18, W25c)

249-G. **New Wheel Rolling Plant in Use at the Nizhne-Tagilskoi Steel Combine.** S. V. Makaev. *Stal',* no. 7, July 1957, p. 616-621. (Iron and Steel Institute, Translation no. 658.)

Previously abstracted from original. See item 436-G, 1957.
(G3, J-general; ST)

250-G. (French.) **What Type of Wheel for Grinding Flat Surfaces?** *Machine Moderne,* v. 12, Mar. 1958, p. 22-24.

(G18, W25c)

251-G.* (French.) **An Interesting Application of the Boring Process.** *Trempe,* v. 34, Jan. 1958, p. 41-46.

French plant uses Beisner boring method for mass production operations on stainless steel billets intended for fabrication of drawn tube. Boring tool has center hole for chip removal. Example of productivity: 37 m. of 34-mm. bore per 8-hr. day on billets 350 mm. long. (G17d; SS, 4-52)

252-G. (French.) **Electrical Contact Wear in Spark Machining.** M. M. Marc Bruma and Jacques Roncin. *Wear.* v. 1, Feb. 1958, p. 305-316.

Experimental method for studying electro-erosion. 8 ref. (G24a)

253-G. **Aluminum Turns a Profit.** *Iron Age,* v. 181, Apr. 24, 1958, p. 114-117.

Aluminum machines best at high speeds, moderate feeds and depths of cut. Importance of proper tool selection for efficient machining at lowest cost. (G17, Al-b)

254-G. **Magnesium Is Easy to Work With.** *Iron Age,* v. 181, Apr. 24, 1958, p. 118-121.

Guide for best machining methods, precautions that must be followed. (G17; Mg)

255-G. **Tips on Machining Copper and Copper-Base Alloys.** *Iron Age,* v. 181, Apr. 24, 1958, p. 122-126.

(G17; Cu)

256-G. **Guide to Machining Titanium.** *Iron Age,* v. 181, Apr. 24, 1958, p. 126-127.

(G17; Ti-b)

257-G.* **Automatic Contour Turning of Large Mill Rolls.** William Hyams. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 82-89.

Lathes with 44-in. by 21-ft. centers and over used for mill roll turning. Capabilities and characteristics of various lathes.
(G17a, W23k)

258-G. **Chemical Milling Light Metals.** F. H. Reed. *Light Metal Age,* v. 16, Apr. 1958, p. 23-27.

(G24b; EG-a39)

259-G. **Cutting Internal Gear Rings on a Liebherr Hobbing Machine.** *Machinery (London),* v. 92, Mar. 21, 1958, p. 675-676.

Operations, equipment and plant layout at German firm of Hans Liebherr using case hardening steel to German specification C-45 (0.42-0.50% C, 0.15-0.35% Si, 0.5-0.8% Mn and 0.45% P and S).
(G17b, T7a, 18-67; ST)

260-G. **Developments in Precision Bending Methods for Waveguides.** F. J. Fuchs. *Machinery (London),* v. 92, Apr. 11, 1958, p. 824-834.

(G6, T1)

261-G. **High Speed Cutting of Drawn and Extruded Sections.** *Machinery (London),* v. 92, Apr. 18, 1958, p. 898-900.

Use of tungsten carbide tipped saw. (G17h, 6-69; Cu-b, Cu-n, Al-b)

262-G.* **Spark Machining of Forging Dies.** M. Rene Chevallier. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 135-138, 144. (Translation of paper issued by the Syndicat National de l'Estampage et de la Forge, France.)

Essentials of the machine are: electrode carrying arm activated by servo motor; equipment for holding and controlling dies; a bath containing a dielectric liquid in which the workpiece is immersed.
(G24a, 1-52, W22a)

263-G. **Test Results on Electrolytic Grinding.** F. Pearlstein. *Metalworking Production,* v. 102, Mar. 7, 1958, p. 418-420.

(G18, G24d)

264-G. **Can Digital Flame-Cutting Pay?** *Metalworking Production,* v. 102, Apr. 18, 1958, p. 675-680.

(G22g; 18-74)

265-G. **A Fresh Look at Leaded Steels.** W. Simon. *Product Engineering,* v. 29, Apr. 14, 1958, p. 72-73.
(G17, Q-general; *Pb,* ST)

266-G. **Boost Your Machining Speeds.** *Steel,* v. 142, May 5, 1958, p. 84-85.
(G17a, W25n; 17-53)

267-G. **Extrusion Slashes Wheel Assembly Costs.** *Steel,* v. 142, May 5, 1958, p. 88-89.
Hot extrusions used in making low cost turbine rotors. (G5, T7h)

268-G. **Review of Recent Literature on the Mechanics of Metal Cutting.** A. J. M. Spencer. *Brown University,* TR 5, Mar. 1957, 20 p.
(G17, 10-54)

269-G. (Dutch.) **Chamfering With the Torch Cutter, a Modern Tool for Pretreatment and Fabrication.** Jean Prat and Metz Sablon. *Lasttechniek,* v. 24, Mar. 1958, p. 42-49.
(G22g)

270-G.* (German.) **Machines for Electro-Erosion and Examples of Their Use.** F. W. Simonis. *Metall,* v. 12, Apr. 1958, p. 262-268.
Importance of automatic electrode feeding; factors influencing precision and surface quality; review of modern electro-erosion machines; examples of use of electro-erosion in manufacturing tools. (G24d, 1-52)

271-G. (German.) **Milling With Hard Metal Armored Cutter Head on Milling Machines of Old Design.** H. der Wiesche. *Werkstattstechnik und Maschinenbau,* v. 48, Mar. 1958, p. 156-162.
Construction and shape of tools; suitable types of hard metal; optimum working angles (free, chipping, chamfer, edge, setting); sharpening of cutters. (G17b, T6n)

272-G. **Ultrasonic Drill for Boring Small Holes in Hard Materials.** N. K. Marshall. *Industrial Diamond Review,* v. 18, Jan. 1958, p. 17-19.
(G24c, W25p)

273-G.* **The Control of Earing in Aluminum and Its Alloys.** R. T. Thorley and G. E. G. Tucker. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 353-361.
Earing of sheet produced in the normal manner (i.e., by homogenizing the ingot, hot rolling, cold rolling, and final annealing) has been found to vary according to the finish thickness. The shape of the curve of earing plotted against finish thickness is dependent upon the fabricating conditions and this curve has been used to show the effects of alloy type and composition, preheating, hot rolling, interannealing and cold rolling. 14 ref. (G4; Al)

274-G. **Principles and Applications of Spark Machining.** D. W. Rudorff. *Institution of Mechanical Engineers, Proceedings,* v. 171, no. 14, 1957, p. 495-511.
15 ref. (G24a)

275-G. **Flame-Cutting of Air Hardening Steels.** M. M. Griffith. *International Acetylene Association, Official Proceedings,* 1956, p. 97-99.
(G22g; ST)

276-G. **Looking Ahead With Chemical Milling.** Jay Sullivan. *Machine and Tool Blue Book,* v. 53, May 1958, p. 127-128, 130, 132, 134-136.
Grain orientation and its directional characteristics and the change in the radius of curvature caused by size reduction to be accounted are the most valuable tips to designer. (G24b)

277-G. **Rotary Extrusion Reduces Costs and Saves Material.** J. Genis and W. Mallindine. *Machinery,* v. 64, Apr. 1958, p. 115-121.
Processes and equipment used for reduction in metal thickness; titanium, steel and others; deformation under pressure up to 50,000 psi. Metal thickness reduced 75% in one pass; different types of rotary extrusion and results obtained.
(G5, G11, G13, T24b; Ti, ST)

278-G. **Man Made Industrial Diamonds for Grinding Wheels.** N. A. Matthews and Norman Leventhal. *Machinery,* v. 64, Apr. 1958, p. 122-127.
Results of tests comparing natural and man-made diamonds; laboratory tests and tables. Applications and limitations. (G18, W25c; NM-k37)

279-G. **Carbide Tooling on Automatics.** *Machinery,* v. 64, Apr. 1958, p. 128-131.
Use of tungsten carbide tools in outer cups for nickel-alloy steel roller bearing production at Duston, England, plant of British Timken Ltd. Processes and details.
(G17b, T7d; AY, W, 6-69)

280-G. **Double End Machining of Unwieldly Castings.** Robert Kennedy. *Machinery,* v. 84, Apr. 1958, p. 140-141.
(G17; CI-s)

281-G. Economical Small-Lot Machining of Large Parts. *Machinery,* v. 64, Apr. 1958, p. 150-154.

Heavy steel weldments and castings for road building equipment processed on special machines. Floor space savings of up to 80% and reductions in capital equipment costs of 50% are possible with these multiple-purpose machines. Operations and results.
(G17, W25; ST, 5-60, 7-51)

282-G.* Forming Titanium Extrusions. I. J. Wilson. Digest of paper given before Titanium Conference, Western Metal Congress, Mar. 1957. *Metal Progress,* v. 73, May 1958, p. 188-189, 192.

Titanium extrusions can be successfully formed by observing five points: take proper steps to secure a good surface condition; form at room temperature or above 1250° F.; do not exceed the limited shrink and stretch allowables; use a generous bend radius; use good tooling.
(G-general; Ti, 4-58)

283-G. High-Speed Coining. Robert M. Johnson and James Mourning. *Metalworking Production,* v. 102, Apr. 25, 1958, p. 724-725.

(G3n, Mg)

284-G. Cutting With Ceramics. Charles E. Penaz. *Northwestern Engineer,* v. 17, Feb. 1958, p. 24-26, 60.

New advance in cutting tool technique. Use of ceramic tool bits. Superiority of ceramic tools over carbides. They can cut at much higher speeds, better finishes, longer tool life and coolants are generally unnecessary.
(G17, T6n; SGA-j; 6-70)

285-G.* Use Chemical Milling to Make Light, Close-Tolerance Parts. Charles H. Lundquist. *Precision Metal Molding,* v. 16, Apr. 1958, p. 54-57.

Application of chemical milling techniques to cast Al, Mg, Ti or steel. Tolerances and surface finishes to be expected.
(G24b; Al, Mg, Ti, ST)

286-G. Enamel Glasses as Lubricants for Forming Sheet Metal. A. Hegarty. *Scientific Lubrication,* v. 10, Feb. 1958, p. 12-13, 24.

Use of low-melting glasses in molten conditions as lubricants.
(G4; NM-h, NM-f42)

287-G. New Machine Whips Contouring Job. *Steel,* v. 142, May 12, 1958, p. 90-91.

Machine to mill jet turbine blades automatically uses rectangular bar stock, operates on principles similar to automatic screw machines.
(G17b, T7h)

288-G. Plastics in Plant Tooling. Otokar F. Bernardin. *Tool Engineer,* v. 40, May 1958, p. 85-88.

Plant experience shows that plastic tools, jigs, fixtures and gages give good performance at a considerable saving over comparable metal tools. (G-general, NM-d)

289-G. Determining Tool Life on Nodular Cast Iron. Gerhard Hug. *Tool Engineer,* v. 40, May 1958, p. 97-103.

Comparative tests indicate that increasing nodular graphite improves machinability markedly. Also, larger nose radii, consistent with finish, are desirable. (G17; CI-r)

290-G. The Arcair Torch. T. D. Warren. *Welding and Metal Fabrication,* v. 26, Feb. 1958, p. 67-70.

A metal-cutting process in which an arc is drawn between a carbon electrode and the workpiece.
(G22h, W29d)

291-G. Grinding of Hard Metals With Electrically Conducting Abrasives, Using Graphite as a Filler. I. K. Trushin. *Vestnik Mashinostroeniya,* v. 37, no. 5, 1957, p. 59-61. (Henry Brutcher, Altadena, Calif., Translation no. 4105.)

(G18; 6-69, NM-j)

292-G.* (English.) Machinability of Metals. Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory of Japan,* v. 3, no. 2, 1957, p. 81-86.

Machining data for Al, Cu, brass, mild steel, alloy steel and cast iron machined under definite conditions and compared with mechanical properties of the metals. Considers machinability in terms of chip formation which is expressed by shear angle or chip thickness ratio. Slope near the fracture point of the shear deformation and stress curves is closely associated with the behavior of the metallic fracture ahead of the tool face during machining and with the tool chip contact area.
(G17k; Al, Cu, CN, AY, CI)

293-G. (French.) Carbide-Tipped Tools and Special Lathes Speed Up Machining of Forged Crankshaft Pins. *Machine Moderne,* v. 52, Apr. 1958, p. 16-18.

A group of four machines synchronized with a conveyer and an automatic fixture loader reduces machining time through use of carbide-tipped front and rear slide cuting tools. (G17, T7j, 6-69)

294-G. (French.) Machining and Grinding Spheroidal Graphite Cast Iron. *Metallurgie et Construction Mecanique,* v. 90, Apr. 1958, p. 273-283.

(G17, G18; CI-r)

295-G. (French.) Carbide Cutting Tools. Max Lainey Broida. *Metaux Corrosion-Industries,* no. 389, Jan. 1958, p. 30-51.

To be continued.
(G17, T6n; 6-69)

296-G. (German and French.) Cutting Tests on Aluminium Alloys. H. Greutert. *Aluminium Suisse,* v. 8, Mar. 1958, p. 41-47.

Aluminium alloys containing Pb and Bi produce desirable short chips, eliminate lathe stoppage. Importance of cutting angle and right working conditions. ("Aludur" types: Al-Cu-Pb-Bi; Al-Cu-Mg-Pb; Al-Mg-Si-Pb; Al-Cu-Mg-Pb)
(G17k; Al-f, *Pb, Bi, Cu, Mg*)

297-G. (German.) How to Grind Carbide Metal and/or Carbide Tips With Diamond Grinding Wheels. G. Pahlitzch and G. Rafflenbeul. *Werkstatt und Betrieb,* v. 91, May 1958, p. 249-257.

(G18, W25c, 6-69)

298-G. (German.) Combination Cutting and Drawing Die. G. Nowak. *Werkstatt und Betrieb,* v. 91, May 1958, p. 280.

Die for drawing a plate-shaped workpiece and for simultaneous cutting and bending of two clamps.
(G4, W24n)

299-G. (Russian.) Thin-Walled Inserts of Bi-Metallic Steel-Aluminum Alloy Strip. L. Yu. Pruzhanskii. *Vestnik Mashinostroeniya,* Mar. 1958, p. 36-37.

(G17, T7d; Al, ST)

300-G. (Russian.) Production of Bearing Inserts With Layer of Babbitt Sheet Secured by Pressing. V. A. Kel'dyushev. *Vestnik Mashinostroeniya,* Mar. 1958, p. 38-39.

(G17, T7d; Sn)

301-G. "Explorer" Nose Cold Formed From 430 Stainless. *Iron Age,* v. 181, Mar. 6, 1958, p. 113-115.

Special cold forming process literally flows a metal blank into shape. (G11; SS)

302-G. Steel-Tube Stampings: Short Cut to Complex Shapes. J. F. Hullman. *Iron Age,* v. 181, Mar. 6, 1958, p. 122-125.

(G1, G3, CN, 4-60)

303-G. Roll Forming Gets an Assist. *Steel,* v. 142, June 2, 1958, p. 70-71.

Squeezing just prior to roll forming turbine blade. (G11, T7h; SS)

304-G. Machinability Can Be Related to Composition. F. W. Boulger and H. J. Grover. *Tool Engineer,* v. 40, Mar. 1958, p. 114-115.

(G17k, 2-60; ST)

305-G.* Behavior of Metals Under High-Energy Loads. Thomas A. Dickinson. *Tool Engineer,* v. 40, Mar. 1958, p. 119-122.

"Explosive forming" in which metals are subjected to high-velocity impacts has made it possible to shape parts from some difficult-to-form materials in one operation without fracture.
(G-general, NM-k34)

306-G. Spraying of Coolants Increases Tool Life. Alex Wilcox. *Tool Engineer,* v. 40, Apr. 1958, p. 111-112.

(G17, NM-h)

307-G.* Finishing Surfaces by Vibration. Richard C. Hitchcock and John P. Moran. *Tool Engineer,* v. 40, Apr. 1958, p. 127-130.

Production-type vibratory lapping machines generate surface finishes as smooth as three micro-in. Flatness is held to within three helium light bands. Productivity is high compared to manual lapping. Lapping of bronze and stainless steel rings for mechanical shaft seals, using this new and relatively inexpensive equipment.
(G19p, 1-52; Cu-s, SS)

308-G. (Czech.) Vlach's Flame Method for Straightening Welded Constructions. Jaroslav Novacek. *Zvaranie,* v. 7, Apr. 1958, p. 112-116.

(G23p, K9q; 7-51)

309-G.* (German.) Die Stamping and Drop Forging. W. Engelhardt. *Neue Hütte,* v. 3, Mar. 1958, p. 165-173.

Review of die stamping industry in various countries. Types of articles that can be stamped. Fundamental processes in stamping and forging. Manufacture of dies—cold stamping, jet lapping, chromium plating. Suitable lubricants. Prevention of scaling. 19 ref.
(G3, F22n, W24n)

310-G.* Hot Sizing. Hottest Way Yet to Precision-Form Titanium? George De Groat. *American Machinist,* v. 102, June 2, 1958, p. 86-88.

"Hot-sizing", a new technique for forming Ti sheet, reduces costs, rejects, increases production 13 times.
(G-general; Ti)

311-G.* **Pinch and Roll Dies Halve Blade Cost.** Anderson Ashburn. *American Machinist,* v. 102, June 2, 1958, p. 89-91.

Combined forming and rolling in a single press produces compressor blades at reduced cost, higher accuracy. Heated part is pinched between shaped rollers, which then revolve to roll blade to shape. (G11, 1-52)

312-G. **The Story of Shot Peening.** George Leghorn. *American Society of Naval Engineers Inc., Journal,* v. 69, Nov. 1957, p. 653-666.

(G23n)

313-G. **Automatic Line Makes Seamless Aluminum Cans.** *Canadian Machinery and Manufacturing News,* v. 68, Nov. 1957, p. 112-113.

One blow from an impact extrusion press sends an Al slug through a five-stage process resulting in complete can. (G5, T10g; Al-b)

314-G. **New Broaching Tool Cuts Helical Gears in One Pass.** R. H. Eshelman. *Iron Age,* v. 181, June 5, 1958, p. 117-119.

(G17d, T7a)

315-G.* **Electromagnetic Test Measures Effects of Shot Peening.** P. M. Unterweiser. *Iron Age,* v. 181, June 5, 1958, p. 121-123.

Technique based on changes in electrical and magnetic properties that result from the plastic deformation found in the compressed layer. It can be applied to magnetic materials only. (G23n, 1-54)

316-G. **Drilling Research.** *Mass Production,* v. 33, Nov. 1957, p. 100-104.

(G17e)

317-G. **Machine Application of Dry-Drawing Compounds.** W. D. Anthony. *Metal Products Manufacturing,* v. 14, Dec. 1957, p. 55-58.

Less cleaning of dies and press areas necessary; machine application more economical than hand application; sheets easier to handle and can be stored for relatively long periods of time between coating and use. (G4; NM-h)

318-G. **Electrolytic Grinding Finishes Hard Faces.** *Metalworking,* v. 14, June 1958, p. 6.

(G18k, G24d)

319-G. **Precision Grinding Sintered Gears Successfully!** *Precision Metal Molding,* v. 16, Mar. 1958, p. 50.

(G18, T7a; Fe, 6-72)

320-G. (Italian.) **Notes on Spark Machining.** Riccardo Mazzanti. *Macchine,* v. 13, Mar. 1958, p. 197-201.

(G24a)

321-G.* **Property of Free Machining.** K. G. Lewis. *Iron and Steel,* v. 31, May 1958, p. 179-183.

Effects of various cutting fluids on machinability and cutting performance of sulphurized or leaded steels. Effect of Pb and similar metallic additives on machining characteristics, structure and mechanical properties of alloy steels, Cu and Al alloys; importance of graphite in machining cast iron; development of free machining properties by means of cold working and heat treatment. (Concluded.) 15 ref. (G17k, 2-60; ST, CI, Cu-b, Al-b, *Pb, S,* NM-h)

322-G.* **The Forming of Flanged and Dished Heads.** H. S. Beers. *Iron and Steel Engineer,* v. 35, May 1958, p. 110-114.

Special machines at Colorado Fuel and Iron Corp. form hemispherical, elliptical or conical heads in steel, stainless, Cu, Ni, Al and their alloys from starting materials over 3/16 in. thick. (G13; SS, ST, Cu, Ni, Al)

323-G. **Machining Blades for Gas Turbine Units.** *Machinery (London),* v. 92, May 1958, p. 1082-1094.

(G17, T7h)

324-G. **Roll Forming Highway Guardrail.** *Modern Industrial Press,* v. 20, May 1958, p. 17-19.

Coil stock of hot rolled, Zn coated 12-gage steel strip punched and formed to "deep beam" guardrail on a continuous line. (G11; ST, 4-53)

325-G. **No-Draft "Pressings" Save Three Ways.** Collins Fuqua. *Modern Industrial Press,* v. 20, May 1958, p. 27-28.

"Pressings" produced by placing pretrimmed blank on a heated mating die and applying sufficient pressure to make metal flow. Mg and Al alloys pressed under conditions similar to conventional forgings do not require draft angle allowance. Machining costs reduced; less processing space and less raw materials. (G1; Al-b, Mg-b)

326-G. **Aluminum Tubing Saves Machining Costs, Weight, Over Solid Bar Stock.** *Western Metalworking,* v. 16, May 1958, p. 52-53.

(G17; Al-b, 4-60)

327-G.* (German.) **Cold Die Sinking of Steel.** K. E. Thelning. *Werkstatts-*

technik und Maschinenbau, v. 48, Apr. 1958, p. 209-215.

Free sinking using cylindrical ram; sinking with holding ring; relationship between sinking depth and hardness of material and diameter of ram. Other factors influencing sinking depth. Practical examples. (G16; ST)

328-G. (Japanese.) **Soviet Metalworking Technology.** Ketsu Inoue. *Metals,* v. 28, Apr. 1958, p. 260-264.
(G17)

329-G. **Slice and Electrogrind Honeycomb for B-52 Panels.** William G. Koehler. *American Machinist,* v. 102, June 16, 1958, p. 93-95.
(G17b, G18, T24b; Al, SS, 7-59)

330-G.* **High Speed Machining. A New Concept.** William E. Montgomery. *Carbide Engineering,* May 1958, p. 9-11.

New titanium carbide uses Ni as a binder and contains molybdenum carbide as an alloy carbide addition. Typical applications. (G17; SGA-j; Ti, 6-69)

331-G.* **Hot-Sizing Titanium and High Temperature Steel Parts.** Charles O. Herb. *Machinery,* v. 64, June 1958, p. 118-121.

Hot sizing presses eliminate wrinkles and warped surfaces from cold formed parts of titanium and stainless steel. Workpiece can range from 0.005 to 0.093 in. thick. Less than 8% of the time needed formerly with bench work is required. (G1; Ti)

332-G.* **Applications of a Verson-Wheelon Press in the Production of Helicopter Parts.** *Machinery, (London),* v. 92, June 6, 1958, p. 1345-1350.

Method of operation of the machine, which is rated at 10,800 tons. The workpiece is placed on a form block, and pressure is applied, through a thick rubber working pad, by means of an inflatable rubber bag, in which an oil pressure of 5000 psi. is exerted. (G14a, W24g)

333-G.* **Titanium Fabrication.** L. P. Spalding. *North Atlantic Treaty Organization Advisory Group for Aeronautical Research and Development,* Report 96, 1957, 33 p.

Detailed survey of material preparation, forming (bending, stretch forming, drop hammer forming, deep drawing), machining, chemical milling, heat treatment, cleaning and pickling, welding and salvage. 8 ref. (G-general, J-general, K-general, L-general; Ti)

334-G.* **Shotpeening Effects and Specifications.** Henry O. Fuchs. Paper from "Metals", ASTM STP No. 196, p. 22-32.

Specifications for shot are concerned with material, shape and size. The specifications of the shot stream intensity are based on the measurement of residual stress effects in a standard sample—the Almen strip; by a standard instrument —the Almen gage. 8 ref. (G23n)

335-G.* (French.) **Ultrasonic Machining.** M. Deribere. *Mecanique,* v. 42, Feb. 1958, p. 59-63.

Principle of ultrasonic machining; abrasives used; metals machinable by this method; machines and tools employed. 23 ref. (G24c)

336-G.* (German.) **Machining of Titanium.** Hans D. Weckener. *Das Industrieblatt,* v. 58, Apr. 1958, p. 119-123.

Physical properties of Ti. Composition of the most important Ti alloys and mechanical properties of some of them. Special conditions of boring, threading, reaming, milling, grinding and sawing. Examples of machining. (G17; Ti)

337-G.* (German.) **Argon Arc Flame Cutting of Nonferrous Metals.** *Das Industrieblatt,* v. 58, Apr. 1958, p. 167.

Peculiarities of arc cutting of nonferrous metals. Cutting method using argon and hydrogen. Cutting speed and gas consumption in case of manual and mechanical burner feed. (G22h)

338-G. (Russian.) **Oxygen-Arc Cutter for Carbon Steels.** *Stanki i Instrument,* Mar. 1958, p. 43.

Electrically heated oxygen cutter using an ordinary carbon electrode. Oxygen is led to the hot metal through a tube resembling an ordinary cutting torch. An eye shield is attached to the cutter. D.C. current of 200 amp. may be supplied by the usual welding generator. (G22; CN)

339-G. (Russian.) **Cutting Forces in the Machining of Aluminum Alloys.** E. I. Feldshtein. *Vestnik Mashinostroenia,* May 1958, p. 62-65.
(G17; Al-b)

340-G. (Russian.) **Modern Methods in the Electro-Erosion Machining of Metals.** B. R. Lazarenko and N. I. Lazarenko. *Vestnik Mashinostroeina,* May 1958, p. 65-69.
(G24a)

341-G. (Russian.) **Some Problems Relating to the Physical Character of Ultrasonic Machining.** I. S. Vainshtok. *Stanki i Instrument,* Apr. 1958, p. 13-14.

(G24c)

342-G.* **Factors Influencing the Performance of Grinding Wheels.** E. J. Krabacher. *American Society of Mechanical Engineers,* Paper No. 58-SA-40, 1958, 7 p.

Measured wear may be translated into terms of grinding ratio. This generally accepted parameter for measuring wheel wear is the ratio of the volume of metal removed per unit volume of wheel worn away. Grinding ratio decreases with increased metal-removal rate and increases with workpiece diameter, decreased chip load, and increased concentration of grinding fluid. 5 ref. (G18, Q9)

343-G. **A Study of the Effects of Tool Flank Wear on Tool Chip Interface Temperature.** D. R. Olberts. *American Society of Mechanical Engineers,* Paper No. 58-SA-41, 1958, 5 p.

Effect of land wear upon the interface temperature between a carbide tool and an AISI 1015 steel workpiece. (G17, Q9, CN)

344-G.* **Controlled Contact Cutting Tools.** B. T. Chao and K. J. Trigger. *American Society of Mechanical Engineers,* Paper No. 58-SA-42, 1958, 9 p.

A substantial reduction in power consumption, an increase in tool life, more effective utilization of cutting fluids and improved surface finish on the machined workpiece have been achieved by suitably controlling the length of tool-chip contact. Reasons for these findings discussed in terms of basic variables in chip formation mechanics. 15 ref. (G17)

345-G.* **Beryllium Machining Characteristics.** Donald R. Walker. *American Society of Mechanical Engineers,* Paper No. 58-SA-43, 1958, 6 p.

Beryllium chip formation is predominantly a brittle fracture process irrespective of the cutting speed, feed or tool geometry used; however, some plastic flow of the chip is observed. Chip uniformity and surface finish improve with light feeds and high tool rake angles. Surface cracking, stick-slip friction and built-up-edge formation on cutting tools are phenomena associated with Be cutting. 5 ref. (G17; Be)

346-G.* **The Effect of a Lead Additive on the Machinability of Alloy Steels.** Norman Zlatin and John V. Gould. *American Society of Mechanical Engineers,* Paper No. 58-SA-53, 1958, 6 p.

Results of turning tests, using carbide tools, on AISI 4147H and AISI 4340H plain and leaded steels at different hardness levels. Data demonstrate at what hardness levels the lead additives are most effective. (G17k, 2-60; AY, *Pb*)

347-G.* **Concentrated Wear of Turning Tools.** V. Solaja and D. R. Cliffe. *Metal Treatment and Drop Forging,* v. 25, May 1958, p. 187-190.

Experiments on cutting carbon steel with carbide-tipped tools demonstrate influence of work-piece surface condition on intensity of localized wear and groove formations. Relation between tool wear and deformation of surface layer. 8 ref. (G17, Q9; CN)

348-G.* **Chemical Milling: How to Do It.** Ken Clark. *Metalworking Production,* v. 102, May 30, 1958, p. 947-949.

Detailed steps of masking, trimming, etching variables, etch bath procedures. (G24b)

349-G. **Steel Fabrication Lighter Than Aluminum.** James B. Teeter and R. Rohrberg. *Metalworking Production,* v. 102, May 30, 1958, p. 950-951.

Anti-icing nozzles for fighter planes are now made of stainless steel instead of Al. Stronger material reduces manufacturing costs 27% and cuts weight 50%. Nozzles are formed in halves, then welded together. (G-general, Kld; SS)

350-G. **Drilling and Reaming With Gun Type Tools.** Herbert Gregg. *Tool Engineer,* v. 40, June 1958, p. 79-84.

(G17e, W25p)

351-G. **Milling Practice Today.** A. O. Schmidt and J. R. Roubik. *Tool Engineer,* v. 40, June 1958, p. 113-115.

(G17b)

352-G. (German.) **Bending of Aluminum Tubes and Sections.** W. Hegmann. *Aluminium,* v. 34, May 1958, p. 266-276.

(G6; Al, 4-60)

353-G.* (Russian.) **Electro-Erosional Properties of Metals.** A. S. Zingerman. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 58-67.

Electro-erosion is produced by heat transferred through the discharge canal of an electrode. The erosion is in proportion with the

discharged energy and its duration. The dependence of critical energy on critical duration appears to be the limit of electrical erosion. 9 ref. (G24a)

354-G. Machining Ultra-High-Tensile Steels. Pt. 2. Drilling and Tapping Tests: Importance of Drill-Point Concentricity and Re-Introduction of Serial Taps for Uniform Metal-Removal. H. J. Pearson. *Aircraft Production,* v. 20, Mar. 1958, p. 114-118.

(G17e, G17f; ST, SGB-a)

355-G.* Grinding a Titanium Alloy With Coated Abrasives. D. E. Cadwell, H. L. Weisbecker and W. J. McDonald. *American Society of Mechanical Engineers,* Paper No. 58-SA-44, 1958, 9 p.

Effects of load, speed, mineral, grit size, lubricant, and in the case of water-based lubricants, lubricant concentration. Lubrication was most significant factor in abrasive performance. Performance increases with load, decreases with speed. 8 ref. (G18; Ti-b)

356-G. Finishing Carbide Dies for Cold Extrusion Production. *Carbide Engineering,* v. 10, June 1958, p. 27-31.

Lapping and finishing of carbide dies with diamonds reduces surface friction and prevents lubricant cutting under working pressures. (G19p; T6r, G5)

357-G. Production Impact Extruding Steel. *Engineering,* v. 185, Mar. 7, 1958, p. 306.

(G5; ST)

358-G. What Is Super Finishing? *Grinding and Finishing,* v. 3, Mar. 1958, p. 28-30.

(G19q)

359-G. Report on Mechanized Billet Grinding Tests in Sweden. C. E. Foogde. *Grits and Grinds,* v. 49, Jan. 1958, p. 3-15.

(G18; ST, 5-59)

360-G. A Few Aspects of the Chemical Reactions Occurring During the Use of Abrasives. Vittorio Satta. *Industrial Diamond Review,* v. 18, May 1958, p. 94-95, 99.

(G18, Q9)

361-G. Comments on the Cutting of Metal Plates With High Explosive Charges. W. E. Drummond. *Journal of Applied Mechanics,* v. 25, June 1958, p. 184-188.

Problem is analyzed by treating the metal hydrodynamically. The hydrodynamic problem is solved in the linearized approximation and it is assumed that the metal splits wherever the pressure becomes sufficiently negative. (G24)

362-G. The Manufacture of Titanium Jet Engine Parts at Lower Costs by Extrusion. Neil J. Feola. *Society of Automotive Engineers,* Preprint, 14B, Jan. 1958, 10 p.

(G5, T24b; Ti)

363-G. (German.) **Cemented Carbide Tools in Action.** K. H. Frohlich. *Industrie-Anzeiger,* v. 80, Mar. 7, 1958, p. 273-277.

(G17; T6n, 6-69)

364-G. (German.) **Economical Belt Grinding of Titanium.** B. Rupprecht. *Industrie-Anzeiger,* v. 80, Mar. 7, 1958, p. 280-284.

9 ref. (G18; Ti-b)

365-G. (Russian.) **Operation of Overhung Die in Sheet Steel Bending.** Y. I. Elovkov and A. I. Rozinov. *Vestnik Mashinostroenia,* May 1958, p. 51-54.

(G6; ST, 4-53)

366-G. (Russian.) **Cutting Forces and Durability of Cutters in Gear Cutting.** V. V. Guseva. *Vestnik Mashinostroenia,* May 1958, p. 57-60.

(G17g)

367-G. (Russian.) **High-Speed Turning of High-Strength Cast Iron.** N. P. Golubon. *Vestnik Mashinostroenia,* May 1958, p. 60-61.

(G17a; CI)

368-G. (Pamphlet.) **Magnesium Tooling Plate Shop Manual.** 55 p. 1958. Dow Chemical Co., Midland, Mich.

Use of Mg extrusions in tooling, shop characteristics of Mg alloys, machining, grinding, polishing, joining, surface protection. (G17, W25, 17-57; Mg, 4-58)

369-G. (Book.) **Techniques of Pressworking Steel Metal.** Donald F. Eary and Edward A. Reed. 472 p. 1958. Prentice Hall, Inc., 70 Fifth Ave., New York 11, N. Y. $12.

Press types, sheet-metal operations, mechanical handling devices, toolsteel. Emphasis is on die design. (G1, W24n; ST)

370-G.* (French.) The Four-Slide Press or Progressive Dies? J. H. van der Burgt. *Machine Moderne,* v. 52, May 1958, p. 9-20.

Four-slide press provides following advantages for fabrication of thin-wall metal parts: less waste of metal, less risk of tool breakage, longer tool life, lower labor costs,

lower tool maintenance costs, closer tolerances. Less set-up time is required and die costs are usually lower for same work done with progressive die; however, if lot is big enough, cost of set-up time and tooling per part will be lower for work done on press. Details for parts in steel, nickel and nickel-steel machined by both methods.
(G1, W24g; ST, Ni)

371-G.* (Japanese.) **Ultrasonic Cutting.** J. Kumabe and M. Masuko. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 109-114.

Ultrasonic two-dimensional cutting using vibrated bite. The frequency is 18.4 KC (constant), amplitude is variable; technique may be applied to aluminum, brass, mild steel or cast iron. (G24c)

372-G.* **Developments in Propane Torch Metal Cutting.** J. R. M. Barclay. *Engineer and Foundryman,* v. 22, Apr. 1958, p. 64-66.

Benefits derived from propane cutting include: reduced gas costs; no flashbacks or popping, with consequent long tip life and minimum cutter maintenance costs; quicker starting and a narrower kerf, resulting in higher cutting speeds; less slag and cleaner edges, which mean a saving in workshop time and labor; less cylinder handling. (G22)

373-G.* **Carbide and Ceramic Tools in the Finish Turning of Steel.** Vladimir Solaja. *Institution of Production Engineers, Journal,* v. 37, June 1958, p. 363-372.

In spite of the fact that the chemical, physical and mechanical characteristics of ceramic tools differ considerably from those of carbide tools, the interesting phenomenon of concentrated tool wear in finish turning of steel (i.e., the formation of grooves at the boundaries of interfaces clearance face/workpiece and rake face/chip) is a characteristic phenomenon in both cases. 16 ref. (G19, Q9, T6n; ST, SGA-j)

374-G. Production of Thick-Based Vessels by Spinning. *Light Metals,* v. 21, June 1958, p. 178-179.

(G13; Al-b)

375-G. Cutting Costs on Turning Operations at Allison. Charles E. Glazier. *Machine and Tool Blue Book,* v. 53, Apr. 1958, p. 114-118.

(G17a, T21b; ST)

376-G. Controlling Grinding Feeds . . . to Micro-Inches. *Machine and Tool Blue Book,* v. 53, Apr. 1958, p. 129-130.

(G18h, T7d, 18-74; ST)

377-G. Got a Tough Milling Job?—Try Chemicals. H. L. Lewis. *Mill and Factory,* v. 63, July 1958, p. 111-112.

Applications and operating procedures for chemical milling. (G24b)

378-G. Controlling Tool Life. L. V. Colwell. *Tool Engineer,* v. 41, July 1958, p. 65-69.

Abstract of paper presented 26th Annual Meeting ASTE. Relates cutting tool life and tool wear with cutting speed, rake angle, feeding force, work material and surface finish. (G17, T6n, Q9)

379-G. High Velocity Machining With Ceramic Tools. Wallace B. Kennedy. *Tool Engineer,* v. 41, July 1958, p. 73-75.

(G17, T6n; NM-f)

380-G.* **Cold Extrusion of Titanium.** A. M. Sabroff, R. A. Sannicandro and P. D. Frost. *Tool Engineer,* v. 41, July 1958, p. 84-90.

Abstract of paper presented at 26th Annual Meeting ASTE. Experimental study of cold extrusion operations on solid and hollow shapes of unalloyed Ti, punch and die designs, equipment, lubricants, test results for backward and forward extrusions. (G5; Ti-b)

381-G. Cutting and Grinding Fluids. E. L. H. Bastian. *Tool Engineer,* v. 41, July 1958, p. 91-92.

Abstract of paper presented at 26th Annual Meeting ASTE. Types of fluids recommended for cooling and lubricating during various cutting and grinding operating on low carbon, high carbon and stainless steels, cast iron and nonferrous metals including Ni, Cu, Al and Mg alloys. (G17, G18, NM-h)

382-G. Sounding Brass. *Welding and Metal Fabrication,* v. 26, July 1958, p. 259-265.

Modern fabrication techniques employed by Boosey & Hawkes, Ltd., in large-scale production of brass musical instruments, with special reference to tube bending. (To be continued.) (G6; 5-60, Cu-n)

383-G.* **Combustion of Liquid Hydrocarbon Fuels for Oxygen Cutting.** Dieu Khuong-Huu, Sheldon S. White and Clyde M. Adams, Jr. *Welding Journal,* v. 37, Mar. 1958, p. 101s-106s.

Semi-empirical formula permits calculation of the adiabatic flame temperature for any oxyhydrocar-

bon flame. Maximum oxygen-hydrocarbon flame temperatures lie between 4900 and 5500° F. and occur when oxygen-to-hydrocarbon ratios are slightly less than stoichiometric. Most efficient use of oxygen is realized when part of the lance oxygen is used for combustion. Convergent-divergent contoured nozzles provide more effective cutting depth. 15 ref. (G22)

384-G. (French.) **Chemical Milling of Aircraft Parts.** C. L. Hibert. *Machine Moderne,* v. 52, May 1958, p. 21-24. (G24b, T24)

385-G. (German.) **Factors Governing the Selection of Drilling Machines. Pt. 1.** E. Schulz. *Fertigungstechnik,* v. 8, Apr. 1758, p. 171-175. (G17e, W25p)

386-G. (German.) **Towards a Greater Application of Noncutting Methods of Shaping.** E. Heinze. *Fertigungstechnik,* v. 8, Apr. 1958, p. 181-184. (G-general)

387-G* Recent Investigations Into the Blanking and Piercing of Sheet Materials. R. Tilsley and F. Howard. *Machinery,* v. 93, July 16, 1958, p. 151-158.

Results of investigation of blanking and stripping forces, finish blanking; effect of die radii. (G2h; G2j; 4-53)

388-G.* This Is a Cold Heading? Paul A. Meline. *Machine and Tool Blue Book,* v. 53, Aug. 1958, p. 91-98, 100.

Cold heading of electrical contacts of Au, Ag, Pd and other metals with diameters down to 0.0265 in.; ratio of head to wire diameter up to 10 to 1. (G10, 1-67, T1; Ag, Au, Pd)

389-G.* Whirlpool Makes Gears at a 4-a-Minute Clip. Darrell Ward. *Machine and Tool Blue Book,* v. 53, Aug. 1958, p. 102-106.

New method of producing an external helix by use of solid high-speed hollow broach gives 92% drop in production time, close tolerances, improved finish and eliminates further machining. (G17d, G17g)

390-G.* German Developments in Flow-Turning. Ing. W. Bosch. *Metalworking Production,* v. 102, July 18, 1958, p. 1247-1251.

Latest equipment and applications for economical production of a large range of components. (G13)

391-G.* Residual Grinding Stresses Can Be Minimized. M. W. Gormly. *Tool Engineer,* v. 41, Aug. 1958, p. 51-54.

Grinding tests indicate that significant amounts of metal can be removed from a workpiece without inducing serious residual stresses. Review of research work with practical implications of studies on these stresses. (G18, Q25h; 9-72)

392-G.* Forming High-Strength Materials. William W. Wood. *Tool Engineer,* v. 41, Aug. 1958, p. 63-69.

By taking advantage of elevated-temperature creep of structural alloys, they can be formed accurately without springback or buckling. Handwork is nearly eliminated; formability is increased 6 to 10 times. (G23, 2-62; SGB-a)

393-G.* (German.) **Outline of Work Done by the Tool Research Institute at Remscheid, Germany.** E. Barz. *Industrie-Anzeiger,* v. 80, June 3, 1958, p. 635-638.

Investigations of stress conditions in the body and cutting edges of tools to determine working behavior and causes of breakage. Various simplified methods for theoretical and experimental tests on tool bodies; measuring and recording devices for stress conditions in tools of strip and disk form as well as for determining the cutting power and edge holding properties of cutting pliers and bolt cutters. Behavior of chain saws and screwdrivers; heat treatment, corrosion protection and surface treatment of tools. 4 ref. (G17, T6n, Q25h, Ag)

394-G. Extrusion Cuts Time From 3½ to 1.5 Min. Anderson Ashburn. *American Machinist* v. 102, July 1958, p. 83-85. (G5; Cu, Al)

395-G. Forming and Painting Wire Garment Hangers. C. R. Brown. *Industrial Finishing,* v. 34, July 1958, p. 40-42, 44, 46.

Machinery and mechanical procedure used, routines performed by the operators. (G6, L26n, 4-61)

396-G. A Practical Manual for Stamping Design. Pt. 1. Flat Stampings. Carter C. Higgins. *Machine Design,* v. 30, July 10, 1958, p. 101-108.

Principles of sound design for flat stampings. (G3; 17-51)

397-G. The New Vauxhall Press Shop. *Machinery (London),* v. 92, June 1958, p. 1432-1455.

Body-building shop. Underdriven presses are mounted on a network of girders above a basement, so that

routine maintenance and inspection can be carried out without stopping production. (G1, T21a)

398-G. Production of Titanium Rings From Extruded Sections. Neil J. Fiola. *Machinery (London),* v. 93, July 1958, p. 16-19.

Higher material utilization, coupled with the use of cast ingots for extrusion, appreciably reduced costs as compared with conventional forging techniques. (G11; Ti)

399-G. Factors Affecting Performance in Cylindrical Grinding. J. A. Mueller. *Machinery (London),* v. 93, July 1958, p. 24-26.

If the wheel is allowed to run off the infeed becomes virtually a plunge cut. The high portion of the wheel face grinds deeper than the low portions and dimensional accuracy of the work cannot be maintained; the favorable contour on the wheel face tends to be destroyed. (G18g)

400-G. How Beryllium Is Machined. D. R. Walker and J. Gubas. *Metalworking Production,* June 27, 1958, p. 1127-1129.

A slow procedure was adopted because of high material cost and concern for surface cracks. Electron microscope studies of machined Be indicated that surface cracks produced by roughing operations can be removed by light cuts followed by a chemical polish. (G17; Be)

401-G. Some Prime Examples of Cold Bending Today. B. F. Bower. *Tooling and Production,* v. 24, July 1958, p. 48-50.

Cold bending is superior to hot bending for accuracy, economy and strength. (G6, 1-67)

402-G. Calculation of Deformation of Bimetallic Bearing Inserts (Bushings) in Die Stamping. L. Yu. Pruzhanskii. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 13-16. (Henry Brutcher, Altadena, Calif., Translation no. 4216.)

When stamping thin inlays for automobile bearings the dimensions vary slightly from those of the dies. Mathematical analysis by which correct dimensions might be obtained may be used also for designing new sizes of inlays providing deviation in the old sizes is known. (G3, T7d, 17-51)

403-G. Effect of Technological Factors on Depth of Strain Hardening in Grinding. Yu. S. Terminasov and A. G. Yakhontov. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 40-43. (Henry Brutcher, Altadena, Calif., Translation no. 4223.)

The inner surfaces of ground steels were studied. Specimens were exposed to electrochemical etching and the hardnesses of respective layers were directly indicated by microhardness. Maximum distortion of structure and change in microhardness were observed in the surface layer at a depth of about 10 microns. (G18, N7e; ST)

404-G. (German.) **Method of Impact Extrusion.** W. Becker. *Deutsche Farbenzeitschrift,* Mar. 1958, p. 90-92. (G5)

405-G. (German.) **Mechanism of Grinding.** Janez Peklenik. *Industrie-Anzeiger,* Jan. 3, 1958, p. 20-27.

9 ref. (G18k)

406-G. (German.) **Economic Gas Cutting and Attainable Accuracy.** H. Christoph and W. Herzfeld. *Industrie-Anzeiger,* no. 33, Apr. 25, 1958, p. 486-492.

4 ref. (G22g)

407-G. (German.) **Cold Saves Steel.** A. Wolf. *Maschinenbau,* Jan. 1958, p. 8-10.

Application of extreme cold in machining. 13 ref. (G17, 1-67; ST)

408-G.* (German.) **Electro-Arcing and Electrosparking.** O. Rudiger and A. Winkelmann. *Metall,* v. 12, May 1958, p. 366-380.

List of all known electrical circuits used for electro-erosion. Characteristics of the method—rate of metal removal, electrode consumption, profile and form accuracy, surface accuracy, effects on the structure of the workpiece and oscillation frequency. Various theories for the electro-erosion process are critically compared and checked. 34 ref. (G24a)

409-G.* (German.) **Argon Arc Cutting, a New Cutting Process.** H. Rotter. *Metall,* v. 12, May 1958, p. 396-401.

Nonferrous metals and steels can be cut economically with a newly developed tungsten arc process under protective gas atmosphere. The apparatus consists of an argon and hydrogen source and d-c. welders in series with a special tungsten electrode holder. Tables for voltage, current and cutting speeds for various materials. Applications. (G22h)

410-G. (German.) **Advanced Punching and Stamping Methods.** W. P. Romanowski. *Neue Hütte,* v. 3, Apr. 1958, p. 238-246.

New methods for forming metal for hot and cold extrusion, drawing, offsetting, crimping, punching and cold pressure welding. 16 ref. (G-general)

411-G. (German.) **Controlled Electro-Arcing and Sparking.** J. Siegfried Spizig. *Schriftenreihe Feinbearbeitung,* July 1957, p. 9-87.

Physical processes; electro-erosion machining techniques. 81 ref. (G24a)

412-G. (German.) **Tool Wear in Cutting Steel Sheets.** Otto Kienzle and Werner Kienzle. *Stahl und Eisen,* v. 78, June 12, 1958, p. 820-829.

Cutting process and wearing phenomena during a closed cut; wear of face, mantle and formation of burr; punching strip or sheets 0.1 to 0.4 mm. thick, made of plain carbon, silicon alloy and stainless steels, using punches and die plates of steel 90MnV 8 and steel X 210 Cr12; effect of roughness and hardness of the tools on wear. (G17, G2, Q9n; ST, 4-53)

413-G. (German.) **Chip Formation in Light Metal Alloys, Especially With Hard Metal Tools.** *Technica,* Jan. 3, 1958, p. 5-10.

(G17, 6-69; Al, Mg)

414-G. (German.) **Machinability of Nodular Cast Iron.** W. Grehn. *VDI-Berichte,* v. 27, 1958, p. 23-27.

5 ref. (G17k; CI-r)

415-G. (German.) **Causes of Defects in the Hobbing of Teeth.** W. Charcut. *VDI-Zeitschrift,* v. 100, Feb. 21, 1958, p. 231-233.

5 ref. (G17b, T7a)

416-G. (Italian.) **Application of Oxy-Acetylene Cutting in Foundries and Steel Mills.** Oscar Grossi. *Fonderia,* v. 7, Apr. 1958, p. 143-151.

7 ref. (G22g)

417-G. (Japanese.) **Grinding of Tungsten Carbide by Copper Bonded Diamond Wheels.** M. Ohkoshi, K. Sakuma and H. Ohsaki. *Engineering Research Institute in Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 13-19.

The decrease of the amount of metal removed by grinding per unit grinding length depends upon the degree of abrasion of cutting edge and the removal of diamond particles. (G18, W25c; W, Cu, NM-k37)

418-G. (Japanese.) **A Sliding Block Type Cutting Test Apparatus.** Kenji Okushima. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 99-102.

Specially designed cutting test apparatus and results obtained. Cutting test with general machine tools such as lathes and millers are usually affected by uncontrolled conditions. Orthogonal cutting test apparatus using a sliding block was designed to diminish such unfavorable effects. (G17, 1-54, 1-53)

419-G. (Japanese.) **Study on Low-Temperature Machining.** J. Kumabe and M. Masuko. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 103-108.

Effects of cooling on cutting force and surface roughness. The experiments consisted of orthogonal and conventional cutting of mild steel, brass, duralumin cooled by alcohol and liquid nitrogen. (G17, 1-67; Al-b, Cu-n, ST)

420-G. (Japanese.) **Theoretical Research on Chatter Vibration.** Shinobu Kato. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 115-119.

A differential equation shows that chatter is a kind of self-excited vibration. General expression for nonlinear vibration was obtained showing conditions for excitation. (G17)

421-G. (Japanese.) **Chatter Frequencies.** S. Kato and T. Goshima. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 119-124.

The frequencies of chatter vibration are calculated using the given equation and discussed in relation to experimental records. Frequencies of chatter in relation to the natural frequency during cutting are accurately indicated by the equation. (G17)

422-G.* **Manual on the Machining and Grinding of Titanium and Titanium Alloys.** Carl T. Olofson. Titanium Metallurgical Laboratory, TML Report no. 80, Aug. 20, 1957, 82 p. Battelle Memorial Institute, Columbus 1, Ohio.

General machining behavior of Ti; drilling, turning, tapping, precision grinding, abrasive sawing, milling of Ti alloys. Tables indicate machinability index, speeds and horsepower required at the cutting point; properties of Ti. (G17; Ti-b)

423-G. **Influence of Microstructure on the Machinability of a Medium Carbon Steel.** A. Gibson. *Australasian*

Engineer, v. 50, Feb. 7, 1958, p. 56-60. 8 ref. (G17k, 3-71; CN-p)

424-G. Spark Erosion of Deep Holes. *Australasian Manufacturer,* v. 43, May 24, 1958, p. 62-65.

Spark erosion of deep holes of small diameter, for example, 0.030 by 4 in., was prompted by the need for such holes, from the solid, in nimonic alloys and heat resisting steels used in the manufacture of gas turbine blades. (T7h, SS, Ni, SGA-h)

425-G. A Designer's Guide to the Electronic-Machining Processes for Intricate Holes and Contours in Non-machinable Materials. Frank Twitchell and J. R. Zimmerman. *Machine Design,* v. 30, June 26, 1958, p. 114-120.

Ultrasonic-impact and electrical discharge methods. (G24)

426-G. Savings in Material and Production Costs by Flow Turning. J. Genis and W. Mallindine. *Machinery (London),* v. 93, July 9, 1958, p. 87-92.

Flow turning or "rotary extrusion" enables hollow parts of circular cross-section to be produced from blanks, drawn cups, welded cylinders, forgings or castings. (G13)

427-G. Lapping 4920-Pound Weldments for Radar Systems. C. E. Calebaugh. *Machinery,* v. 64, July 1958, p. 136-139.

(G19p; 7-51)

428-G. Tool Lapping Machines Use Boron Carbide. *Metalworking Production,* v. 102, June 6, 1958, p. 995-996.

Boron-carbide lapping wheels contain 30 times more abrasive at less than 1/3 the price of diamond wheels. (G19p, W25c; B, 6-69)

429-G. Explosives Press-Form Difficult Shapes. D. W. Cole. *Metalworking Production,* v. 102, June 20, 1958, p. 1088-1090.

Virtually every operation possible with a drop hammer, press, brake or stretch-forming press has been duplicated by explosive forming. Pressures up to 3,000,000 psi., temperatures to 9000° F. are theoretically possible. (G-general; NM-k34)

430-G. Cold Working of Metals. D. J. Davis. *Society of Automotive Engineers,* Preprint S65, Feb. 1958, 16 p.

New developments in cold extrusion and cold rolling of low and medium-alloy steel parts. (G5, G11; AY)

431-G. Techniques and Material for Cold Extrusion. Robert W. Gardner. *Society of Automotive Engineers,* Preprint 36A, Mar-Apr. 1958, 13 p.

(G5)

432-G. Problems of the Production of Sheets for Deep Drawing in the Automobile Industry. G. D. Rogoza. *Stal',* v. 17, no. 10, 1957, p. 941-943. (Iron and Steel Institute Translation no. 745.)

Previously abstracted from original. See item 109-G, 1958. (G4f, T21a; ST-c)

433-G. Raising the Temperature of Finishing Deformation as a Means of Reducing the Force Required for Large-Size Forging Blanks. A. V. Altykis and N. I. Belan. *Metallovedenie i Obrabotka Metallov,* no. 10, 1957, p. 48-52. (Iron and Steel Institute Translation no. 917.)

Previously abstracted from original. See item 108-G, 1958. (G3, 2-61; ST, 4-52)

434-G. Comparison of the Advantages and Disadvantages of Turning and Grinding the Grooves in the Rolls of Wire Rod Mills. Pt. 1. Investigation on the Life of Turned and Ground Rolls. Pt. 2. Economic Problems in the Dressing of Rolls. Torsten Palm and Hans Warrol. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 35-39. (Iron and Steel Institute Translation no. 946.)

Previously abstracted from original. See item 107-G, 1958. (G17a, G18, W23k)

435-G. (Czech.) Air-Operated Flame-Gouging With a Carbon Electrode. Jan Skriniar. *Zvaranie,* v. 7, June 1958, p. 171-175.

(G22g)

436-G. (French.) Effect of Peening With a Gun on the Tensile Fatigue Strength of Butt Welded Joints and Plates With Welded Connections. *Soudage et Techniques Connexes,* v. 12, May-June 1958, p. 231-236.

Weld peening carried out by compressed air gun controlling a multiple tool made up of a bundle of separate needles. Repeated tensile fatigue tests show that the improvement due to the operation may be 35% at least. In particular, the strength of the weakest assemblies (plates with welded connections) can thus be brought to the level of the strongest ones (butt welded joints), when no peening has been performed. (G23n, Q7; 7-51)

437-G. (German.) Characteristics of Spark Erosion Machining of Hot Work

Steels. H. Obrig. *Industrie-Anzeiger,* v. 80, June 13, 1958, p. 681-684.

7 ref. (G24a; TS)

438-G. (German.) Improved Machinability of Carburizing Steel Through Heat Treatment. W. Seifert. *Maschinenbau,* Jan. 1958, p. 16-17.

(G17k, 2-64; ST)

439-G. (Japanese.) Study of Cold Machining. Pt. 1. Junichiro Kumabe and Masami Masuko. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 103-108.

Effects of temperature on cutting force and surface roughness in machining mild steel, brass and duralumin. 6 ref.
(G17, 2-61; ST, Cu-n, Al-b)

440-G.* The Effect of Grinding on Fatigue Strength. *Australasian Manufacturer,* v. 43, June 14, 1958, p. 78-84.

Good commercial grinding practice did not lower the fatigue limit even though moderately high tensile stresses were generated during grinding. Severe grinding did cause a drop in the fatigue limit, but this was much less than might be expected in view of the high tensile stresses present. Under certain grinding conditions in which grinding oil was used, the surface was actually strengthened enough to raise the fatigue limit appreciably above its normal value. (G18, Q7)

441-G. Milling Titanium Alloys. *Mechanical World and Engineering Record,* July 1958, p. 302-304.

Avoid butt-mill applications (high-speed steel and carbide); use helical carbide slab mills (45° recommended); apply coolant liberally, using sulphur-base oil flow or spray mist coolants; check closely on cutting tool wear, removing dull tools immediately. (G17b; Ti-b)

442-G. Slitting and Shearing at the Westinghouse Columbus Plant. *Metal Products Manufacturing,* v. 15, Aug. 1958, p. 21-23.

(G2)

443-G. Contour-Finishing to 2 Micro-Inches. Rupert Le Grand. *Metalworking Production,* v. 102, July 25, 1958, p. 1299-1301.

Use of air-activated microvalves for checking dimensions, and a combination hydraulic-electric tracer system for machine tool control.
(G18m, W25s)

444-G. Costs Reduced—by Integrating Welding and Machining. J. H. Brems. *Tool Engineer,* v. 41, Aug. 1958, p. 75-79.

Application of automation principles to welding has increased production and quality of many parts. Typical examples of parts processed by these techniques, with emphasis on equipment requirements.
(G17 K1 1-72)

445-G. (German and French.) Bevel Flame Cutting in Modern Machining. Jean Prat. *Zeitschrift für Schweisstechnik* v. 47, Nov. 1957, p. 275-278.

(To be continued.) (G22)

446-G. (German.) Floturn Process in Manufacturing Cone-Shaped Articles of Aluminum. Pt. 1. H. Reichel. *Fertigungstechnik,* v. 8, May 1958, p. 201-205.

Short outline of spinning and deep drawing and comparison with floturn process. Theoretical considerations on deformation of metal in the latter process. Experimental unit and technique. 6 ref. (G13, Al-b)

447-G. (German.) Evaluation of Tool Wear in Hobbing. A. Kirberg. *Fertigungstechnik,* v. 8, May 1958, p. 217-225.

Computing tables. (G17b)

448-G. (German.) Rough Milling of Square Steel Ingots With Carbide Tools. A. Reinartz. *Industrie-Anzeiger,* no. 36-37, May 9, 1958, p. 60-64.

(G17b, 6-69; ST, 5-59)

449-G. (Japanese.) Cutting Mechanism of Honing. Tokio Sasaki and Kenjiro Okamura. *Japan Society of Mechanical Engineers, Transactions,* v. 142, June 1958, p. 372-377.

Cutting efficiency of honing compared with that of superfinishing.
(G19)

450-G. (Japanese.) A Study on Electro-Spark Machining by the Alternating Current. Tokuzo Matsuyama and Takao Kayaba. *Japan Society of Mechanical Engineers, Transactions,* v. 142, June 1958, p. 392-398.

(G24a)

451-G.* Explosive Metallurgy. H P. Tardif and W. H. Erickson. *Canadian Mining & Metallurgical Bulletin,* v. 51, June 1958, p. 352-359.

Practical applications of explosives to metallic or mechanical systems: explosive rivets and bolts; cartridge-powered tools; shaped charges; engraving of metal plates; explosive testing of steels; explosive forming of metals. Metals react differently under impulsive loading. Me-

chanical and structural changes include fracture and flow-pattern changes, little distortion of metal except for area of impact. Changes in microstructure have been observed, but little work has been done as yet to explain changes. (G23, Q6)

452-G.* Beryllium Machining Characteristics. Donald R. Walker. *Mechanical Engineering,* v. 80, Aug. 1958, p. 57-62.

Surface damage, chip formation, cutting temperature, tool life, rake angle and their effects. (G17; Be)

453-G. Automatic Grinding With Coated Abrasives Finds Widespread Use for Roughing, Finishing and Polishing. J. Karl McLaughlin. *Machinery,* v. 64, Aug. 1958, p. 122-136.

(G18, L10b, W25c; NM-j)

454-G. Developments in Precision Boring. C. L. David. *Machinery (London),* v. 93, July 30, 1958, p. 243-250.

Clamping techniques, effect of cutting forces, carbide tools and boring bars, tool adjustment, multi-spindle machining, automatic loading devices and methods of automatic control. (G17d)

455-G. Improved Methods for Deep Drawing. *Metal Progress,* v. 74, Aug. 1958, p. 84-86.

Equal ductility in both directions —longitudinal and across rolling direction—is desirable for deep and difficult stampings. Steel and aluminum sheet, as well as new metals such as beryllium and zirconium, may be improved in this manner by the same techniques as control the direction of crystallization of iron-silicon transformer sheet. (G4b, Q23q)

456-G. Hobbing After Hardening Avoids Distortion. M. E. Samuelson. *Metalworking Production,* June 13, 1958, p. 1033-1035.

Process results in reduction of errors in lead, profile and runout, with better finish, and less grinding required. (G17b)

457-G. Let's Look at Honing, Your Latest Maintenance Tool. Steve Elonka. *Power,* Aug. 1957, p. 118-119.

Typical applications. (G19n)

458-G. Forming Molybdenum Tubing: Grain Size Is Key. *Steel,* v. 143, Aug. 11, 1958, p. 82-83.

Arc-cast Mo can be formed by cold extrusion. Grain refining is a key step. Good properties result but material loss is high. (G5; Mo, 4-60)

459-G. Machining Speeds Tripled of Tough Missile Metals in Cutting Tool Tests. H. F. Wallen. *Western Metalworking,* v. 16, June 1958, p. 72-73.

Tests show higher speeds, throw-away carbide inserts and special grinding machines improve production. (G17, G18, T6n; SGA-j)

460-G. (French.) New Applications of Ultrasonic Machining. J. Welch. *Machine Moderne,* v. 52, June 1958, p. 9-12.

(G24c)

461-G. (Japanese.) Behavior of Chip in Cutting Steel. Keiji Okushima and Kiyoshi Minato. *Japan Society of Mechanical Engineers, Transactions,* v. 142, June 1958, p. 333-339.

9 ref. (G17; ST)

462-G. (Japanese.) Grinding Fluids. Pt. 1. Ryozo Furuichi and Yukio Tanaka. *Japan Society of Mechanical Engineers, Transactions,* v. 142, June 1958, p. 340-345.

Relationship between grinding ratio, tangential grinding force, wear of grinding wheel and dilution of grinding fluids. (G18)

463-G.* Property of Free Machining. Fundamental Considerations. K. G. Lewis. *Iron and Steel,* v. 31, Mar. 1958, p. 85-91.

Chip formation and the basic properties affecting machining performance. Free-machining additives; methods of addition of sulphur and lead to steel. Influence of cutting fluids on the machining of free-cutting materials; effect of graphite in cast iron and cold working of steel as free-machining aids. 61 ref. (G17k; ST, CI, *S, Pb*)

464-G.* (English.) Electric Spark Machining of Metals. Jindrich Stanek *Czechoslovak Heavy Industry,* no. 5, 1958, p. 33-46.

General principles; characteristics of both "Sparcatron" and anode mechanical methods; relation of energy liberated by discharge, frequency of discharge, physical properties of electrode and workpiece and magnitude of gap to the rate of metal removal; properties of machine surface; tolerances; performance of Czechoslovak machines of both types. 5 ref. (G24a, 1-52)

465-G.* (Japanese.) **Study of High Speed Machining. Pt. 10. Machinability of Materials.** Hidehiko Takeyama and Eiji Usui. *Government Mechanical Laboratory, Journal,* v. 12, May 1958, p. 89-93.

Machining characteristic as defined by shear angle or chip thickness ratio can be analyzed only by tool-chip contact area. Aluminum, copper, brass, mild steel, alloy steel and Meehanite cast iron machined under definite conditions to investigate tool-chip contact area and chip formation. Results compared with shearing stress data. Verified that slope of shear test curve near the rupture point is closely related with tool-chip contact area or machinability. 4 ref.
(G17k; Al, Cu, Cu-n, AY-b, CI)

466-G. Apply Rolling Before Chromium Plating of Heavy Loaded Components. G. P. Kotlyarevskii. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 52-53. (Henry Brutcher, Altadena, Calif., Translation no. 4286.)

Although electrolytic chromium plating increases wear resistance, it also tends to weaken resitsance to corrosion and fatigue. To overcome these harmful effects it is recommended that surfaces be rolled before plating.
(G23s, L17, Q9n, Q7; Cr, 8-68)

467-G. Flame Washing for the Foundry. *Foundry Trade Journal,* v. 105, Aug. 7, 1958, p. 177-178.

(G22, L10)

468-G. Choose the Right Contact Wheel for Better Belt Grinding. *Iron Age,* v. 182, July 3, 1958, p. 64-66.

(G18k, W25c)

469-G. A Practical Manual for Stamping Design. Pt. 2. Carter C. Higgins. *Machine Design,* Aug. 7, 1958, p. 111-117.

Design principles for flanged parts, tabs, reinforcing, deep drawing alteration of thickness.
(G3, 17-51)

470-G. Peenamatic Shot Peening Machine for Forming Integrally-Stiffened Wing Panels. *Machinery (London),* v. 93, Aug. 6, 1958, p. 311-312.

(G23n, 1-52, T24a)

471-G. Ultra-Precision Grinding of Small Cylindrical Parts. *Machinery (London),* v. 93, Aug. 6, 1958, p. 313-314.

(G18)

472-G.* (Italian.) **Study of Deformation of Material During Wiredrawing. Pt. 2.** Mario Lanfranco. *Ingegneria Meccanica,* v. 7, Mar. 1958, p. 7-15.

Types of friction and relative values of coefficient of friction; heating of wire and die during drawing; lubrication and wear; characteristics and behavior of mineral and organic lubricants. 17 ref.
(G28, Q9)

473-G. Natural Gas for Cheaper Cutting. William J. Semple. *American Machinist,* v. 102, Aug. 25, 1958, p. 69-71.

(G22g; RM-m35)

474-G. Machinability Testing. David N. Smith. *American Society of Tool Engineers, Research Report no. 8,* 1958, 4 p. $1.

Metal-cutting operation treated as "input-output" process, with input being controlled variables (machine, process, environment) and output being machine wear, chips, tool wear, and product characteristics.
(G17k, 1-54)

475-G. The Mechanism of Chip Formation. Donald Gideon, Ralph Simon and Horace Grover. *American Society of Tool Engineers, Research Report* no. 9, 1958, 8 p. $1.

(G17)

476-G. Some Thermal and Physical Aspects of Cutting. Ralph Simon, Donald Gideon and Horace Grover. *American Society of Tool Engineers, Research Report no. 10,* 1958, 7 p. $1.

(G17, 2-61)

477-G. Present Knowledge of Cutting Fluids. Stanley L. Cosgrove and Roy W. Greenlee. *American Society of Tool Engineers, Research Report no. 11,* 1958, 19 p. $1.

Role of cutting fluids; principles and experimental data on theory of cutting fluid action. (G17; NM-h)

478-G. Influence of Metallurgical Properties on Metal-Cutting Operations. Francis W. Boulger. *American Society of Tool Engineers, Research Report no. 12,* 1958, 19 p. $1.

(G17k)

479-G. What Is Known Today About Metal Cutting. Francis W. Boulger. *American Society of Tool Engineers, Research Report no. 14,* 1958, 9 p. $1.

Tool life, productivity, chip formation, cutting temperatures and

fluids, surface finish, testing methods; influence of tool and cut geometry, cutting speed, microstructure. (G17, G25, 3-71; NM-h, 17-52)

480-G. Computer Control in Flame Profiling. *Canadian Metalworking,* v. 21, Aug. 1958, p. 28, 30, 32, 34, 36, 37.

Computer-controlled flame cutting unit leads to elimination of templet making and hand control in curve profiling.
(G22g; 18-67, 18-74)

481-G. Orthogonal Cutting of a Work-Hardening Material. D. G. Christopherson, P. L. B. Oxley and W. B. Palmer. *Engineering,* v. 186, July 25, 1958, p. 113-115.

Development of approximate theory; mathematical analysis. Calculation of relationships between chip thickness and rake angle, other variables. (G17, 10-52)

482-G. Sub-Zero Quench Aids Aluminum Forming. R. T. Delaney. *Metalworking Production,* v. 102, Aug. 8, 1958, p. 1384-1385.

(G1, G17, 2-63; Al-b)

483-G. Finish-Machining Graphite Wheel Molds. Gilbert C. Close. *Modern Machine Shop,* v. 31, Sept. 1958, p. 136-138.

Tracer-controlled boring mill equipped with single-pass cutting tools is used to prepare and maintain graphite molds for railroad car wheels. (G19r, W19g, 1-59; NM-k36)

484-G. Cut Costs on Machining Die Castings. *Precision Metal Molding,* v. 16, Aug. 1958, p. 23-28.

Special machines and some of the standard components that can be used for tapping, drilling, surfacing a mounting face or milling contours that cannot be cast.
(G17; 5-61)

485-G. Explosives Form Space Age Shapes. *Steel,* v. 143, Aug. 25, 1958, p. 82-86.

(G-general; NM-k34)

486-G. (Italian.) **Metallurgy and Machinability of Steels.** Ferruccio Grandi and Athos Masi. *Ingegneria Meccanica,* v. 7, Jan. 1958, p. 7-15.

11 ref. (G17k; ST)

487-G. Stock Dies Cut Short Run Costs. *Metal Forming and Fabricating,* v. 20, Aug. 1958, p. 26-27.

(G3, W24n)

488-G. New Methods Meet the Challenge of Honeycombs. *Steel,* v. 143, Sept. 1, 1958, p. 60-61.

Machining and fabricating methods which maintain the close tolerances required in contoured panels from honeycomb.
(G-general, T24a; 7-59)

489-G. Impact Extrusion Takes on Hard Alloys. *Steel,* v. 143, Sept. 1, 1958, p. 64-65.

(G5; Al-b)

490-G. Machining and Fabricating High Strength Steels. Paul S. Kikeli and Francis Farago. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 41-51.

Problems include: unusually complex shapes which must be machined all over; a considerable portion of the machining must be performed after heat treatment to meet decarburization control requirements; materials being tempered on a production basis to a hardness never previously used for structural applications; extremely close tolerances for dimensional accuracy and surface finishes.
(G17, T24; SS, SGB-a)

491-G. The Cold Roll-Forming Process—and as Applied to Semi-Austenitic Stainless Steels. Frank Jacobs. Paper from "Sheet Materials for High-Temperature Service", American Society for Metals, 1958, p. 51-68.

Cold roll-forming of 17-7 PH and PH 15-7 Mo stainless steel sheet and plate has been accomplished with reductions up to 65% in one pass of the roller. Cylindrical blanks machined from 17-7 PH bar stock were cold reduced up to 47.5%. Tensile properties which resulted from roll forming; effect of subsequent heat treatments upon the roll-formed material to develop additional strength in the formed part. 13 ref. (G11, SS)

492-G.* (German.) **Roll Spinning of Cone-Shaped Aluminum Parts. Pt. 2.** H. Reichel. *Fertigungstechnik,* v. 8, June 1958, p. 252-260.

Mathematical studies carried out with the help of an experimental machine to determine the values of the feeding force, measured axially, and of the reacting force, measured

radially to the chuck. Relationship between these forces, the chuck and roll radii, the distance roll to chuck, roll velocity and feed. Feed limits determined, feeding and reacting forces varying with the thickness of material and its properties. (G13; Al)

493-G.* (German.) **Smoothing and Reworking of Center Bores With Cone-Shaped Grinding Tools.** Artur Schatz. *Werkstattstechnik und Maschinenbau,* v. 48, July 1958, p. 349-354.

Special grinding machines and operations for eliminating defects in center bores. Bores with minor defects are smoothed with grinding tools providing surface contact with the bore. Heavier imperfections are reworked by grinding with linear contact between tool and bore. In the latter case either the part is given a circular movement, leaving the spindle axis stationary, or the part stays at rest and the spindle axis describes a circular path. The grinding cone can be shaped by built-in devices. (G17d, 1-52)

494-G.* **Abrasive Cutting.** *Draht (English Edition),* no. 35, June 1958, p. 28-31.

Advantages of abrasive cutting for parting wire rope, cable, rod, tube, sheet or plate. Cutting wheel selection, limitations on workpiece size; features of Swiss and German abrasive cutting machines. (G17; NM-j)

495-G.* **Some Experiments on the Impact Extrusion of Aluminum, Copper and Steel.** D. F. Galloway. *Machinery (London),* v. 93, Aug. 13, 1958, p. 356-372.

Preparation of slugs, tools and equipment, variations of extrusion force with punch penetration, effect of wall thickness on extrusion force, effect of slug temperature and metal flow during reverse extrusion. (G5; Al, Cu, ST)

496-G. Precision Machines Slice and Dice Transistor Elements. Charles Emerson. *American Machinist,* v. 102, Sept. 8, 1958, p. 85-86.

High surface speeds and slow feeds allow precision cutting of small brittle crystals. Ultrasonic techniques also used for high accuracy. (G17k, G19, T1k; EG-j31)

497-G. How to Select and Apply Cutting Fluids. Antoni Niedzwiedski. *Canadian Machinery,* v. 69, Sept. 1958, p. 82-85.

(To be continued.) (Q17; NM-h)

498-G. Shot Peening and the Use of Steel Wire Slugs. Baurant W. Gesell. *Draht (English Edition),* June 1958, p. 26-27.

Considerations governing use of steel wire slugs as peening media. Slug dimensions, properties, deformation and life. (G23n, W2a; ST, 4-61)

499-G. Rocket-Engine Manufacture Requires Machining Ingenuity. Charles O. Herb and W. Edward Moller. *Machinery,* v. 65, Sept. 1958, p. 121-126. (G17, T24b)

500-G. How Easily Can Honeycomb Structures Be Machined? R. G. Kellner. *Machinery,* v. 65, Sept. 1958, p. 132-137. (G17; 7-59)

501-G. Pilots for Progressive Dies. Federico Strasser. *Machinery,* v. 65, Sept. 1958, p. 146-150. (G3, W24n)

502-G. Smooth Finishes Obtained by Roller Burnishing. C. R. Morris. *Machinery (London),* v. 93, Aug. 27, 1958, p. 471-472.

Internal and external finishes up to 5 micro-in. obtained by burnishing with carbide rollers in adapters mounted on standard vertical drills. (G19r)

503-G. Equipment for the Economical Batch Machining of Large Parts. *Machinery (London),* v. 93, Sept. 3, 1958, p. 525-529. (G17; 1-62, W25)

504-G. Designing Metal Stampings. John L. Everhart. *Materials in Design Engineering,* v. 48, Sept. 1958, p. 109-124.

Blank layout, holes, bends, radii and tolerances; working characteristics of the metals most commonly used. (G3; 17-51)

505-G. Hobbing Extrusion Cuts Production Time. *Metalworking Production,* v. 102, Aug. 15, 1958, p. 1427-1429.

Production of intricate shapes in a single operation by hobbing or cold extrusion. (G5, G17b)

506-G. Which Cutting Fluid for Abrasive Belt Grinding? Hugh N. Dyer. *Metalworking Production,* v. 102, Aug. 22 1958, p. 1469-1471. (G18k; NM-h)

507-G. Stainless Honeycomb Electrolytically Ground. William G. Koehler. *Metalworking Production*, v. 102, Aug. 22, 1958, p. 1477-1479.
(G24d; 7-59; SS)

508-G. Ultrasonic Machining. *Product Engineering (Design Digest)*, v. 29, Sept. 1958, p. D12-D13.

Principles, handling methods, methods of feeding abrasives, effect of grit size on surface finishing, applications. (G24c)

509-G. (Italian.) **Coolants for Metalworking Operations.** Domenico Viotti and Angelo Albertocchi. *Ingegneria Meccanica*, v. 6, July 1957, p. 17-22.
(G17; NM-h)

510-G. (Italian.) **Plastic Working of Sheet Steel. Pt. 1. The Material.** Riccardo Levi. *Rivista di Meccanica*, June 7, 1958, p. 9-14.

Tests for determining physical properties of sheet; information tests provide on machinability; study of crystal structure for same purpose. (To be continued.)
(G17k; ST, 4-53)

511-G. (Russian.) **Simplified Method for Testing Broachability of Metals.** N. S. Kirvalidze and I. Yu. Korobochkin. *Zavodskaya Laboratoriya*, v. 24, no. 7, 1958, p. 850-854.

Method consists of determining critical point at which object, under pressure, forms cavity. 6 ref.
(G17k, 17-52)

512-G.* (English.) **Theoretical Investigation of Production of Gears by Hot Rolling.** I. Voros. *Acta Technica*, v. 21, no. 1-2, 1957, p. 47-78.

Equipment for hot rolling gears; device for drawing tooth profile; theoretical relationships and calculations involved in determining initial diameter of gear blank; deducing pressure angle of tool; determining tooth thickness at general sintered distances; finding dimensions of master gear tool and other determinations necessary for hot rolling gears; fatigue strength in hot rolled gears. (G11, T7a)

513-G.* (French.) **Manufacture of Test Pieces by Hydroforming.** T. C. Barrett. *Machine Moderne*, no. 592, July 1958, p. 31-34.

Blank is put on the support plate of the press, hydraulic chamber is lowered, rim of blank exposed to an initial pressure to avoid folding, punch moves up pressing the blank against rubber diaphragm of chamber, forming the part. (G14b)

514-G.* **Sounding Brass. Pt. 2.** *Welding and Metal Fabrication*, v. 26, Aug. 1958, p. 281-288.

Dimpling, bending, expanding, stretch-bending, shaping and other operations as performed on brass tubing in production of musical instruments. Bending and stretch-forming machines.
(G-general, T9r; Cu-n, 4-60)

515-G.* **Cooling of Cutters by Heavy Pressure Stream.** *Machine and Tool Blue Book*, v. 53, Oct. 1958, p. 104-111. (From *Mechanical Engineering News (Moscow)*, Dec. 1957.)

Analysis of the influence of different cooling methods on the durability of the tool under practical operating conditions. (G17; NM-h)

516-G.* **Gun Drilling.** Claude E. Sonday. *Machine and Tool Blue Book*, v. 53, Oct. 1958, p. 112-120, 122, 124.

Gun drilling is capable of producing deep holes, such as are required in artillery pieces and in aircraft hydraulic gear, with great speed and accuracy. It is applicable to most common materials. It is a form of boring. The gun drill is made with a single straight flute with the cutting edge limited to the forward tip. (To be continued.)
(G17d)

517-G.* **How to Deplate a Rocket Engine or Rocket Engines Electrolytically Ground for Fast Metal Removal.** E. A. Werner and William E. Hoffman. *Tooling and Production*, v. 24, Oct. 1958, p. 53-54.

A 300-amp. electrolytic power supply unit used on a DoAll G-10 surface grinder for grinding the "Christmas-tree" form of the root section on jet engine blades. It is now used on a lathe as an aid to overcome one of the difficult finishing problems created by a new rocket engine design. Besides the increased grinding rate, very significant savings accrue from the fact that the electrolytically ground surface is absolutely free from burrs or layover. (G18, G24d)

518-G. Only Pencil Outline Required for this Tracing System. *Canadian Metalworking*, v. 21, Sept. 1958, p. 34, 36, 38.
(G22g)

519-G. Tool Steel Bows to Deep Drawing. P. M. Unterweiser. *Iron Age*, v. 182, Sept. 18, 1958, p. 83-85.
(G4b; TS-b)

520-G. **Reducing Electrode Wear in Spark Machining.** **Metalworking Production,** v. 102, Sept. 12, 1958, p. 1608-1614.
(G24a)

521-G. **Automatic Spinning of Titanium.** Gilbert C. Close. *Modern Machine Shop,* v. 31, Oct. 1958, p. 108-115.

Machines and processes employed in making hot spun Ti hemispheres. (G13; Ti)

522-G. **Milling Applications Unlimited.** Colin Sharp. *Modern Machine Shop,* v. 31, Oct. 1958, p. 136-140.
(G17b, W25r)

523-G. **Research Into Deep Drawing.** G. Murray. *Sheet Metal Industries,* v. 35, Sept. 1958, p. 657-675.

Theories of the deep drawing process; tests for the assessment of deep drawing properties. (G4b)

524-G. **Designing for Production.** J. V. Harding. *Sheet Metal Industries,* v. 35, Sept. 1958, p. 676-677, 684.

Ease of manufacture considered as a factor in parts design. (G3; 17-51)

525-G. (Russian.) **Experiments in Using Disks for Hot Sawing.** V. V. Tatarnikov. *Stal',* v. 18, Aug. 1958, p. 716-717.

Best results obtained when hardness of cutting teeth was Rockwell C-55 to 60. Annealing lengthens service span by 15%. Use of steel with tensile strength of 70-80 kg. per sq. mm. is recommended. (G17h, W24m; ST, 2-64)

526-G.* **Impact Extrusion of Steel Wrist Pins.** *Precision Metal Molding,* v. 16, Oct. 1958, p. 40-42.

Steel used is AISI 5015, cold drawn and annealed. Billets are phosphate coated and lubricated with a soap-like material and then extruded. Web removal, hardening and grinding follow the extrusion process. (G5, T21b; ST)

527-G.* **Eliminating Edge Breaking by Ultrasonic Cutting.** Burton B. Stuart. *Grinding and Finishing,* v. 4, Aug. 1958, p. 34-35.

Ultrasonic cutting head mounted on new-design suspension system cuts brittle ferrites, semiconductor materials with sharp corners, low reject rate. (G24d; EG-j31)

528-G.* **Oxy-Gasoline Cutting Torch Works Fast, Lowers Cost.** William Czygan. *Iron Age,* v. 182, Oct. 23, 1958, p. 66-67.

A new flame torch cuts through ½ in. steel at 30 ips. on just 12 cc. of gasoline and 48 liters of oxygen. Savings result in fuel, reduced labor, storage and handling costs. There is little or no slag left. (G22g)

529-G.* **Completely Carbide.** C. R. Morgan. *Automatic Machining,* v. 19, Oct. 1958, p. 37-39.

Carbide can increase production on turret lathes and similar chucking-type turning machines so the advantage should be multiplied on single and multiple-spindle automatics, where many tools are employed, and where tool tending time is a major factor in production costs. (G17a; SGA-j, 6-69)

530-G. **Draw Die Forms Tapered Parts.** Charles Myers. *Iron Age,* v. 182, Oct. 9, 1958, p. 86-87.

A 259-in. tapered strip drawn into complex cross section by using die with movable segments, controlled by part thickness. (G4, W24n, 1-52)

531-G. **Electro-Chemical Machining.** *Machine and Tool Blue Book,* v. 53, Oct. 1958, p. 129-132, 134.
(G24d)

532-G. **Faster Hobbing of Gears With More Accuracy.** A. Budnick. *Metalworking Production,* v. 102, Sept. 26, 1958, p. 1686-1689.
(G17b, T7a)

533-G. **Trends in Gear Cutting and Finishing Processes.** A. Sykes. *Metalworking Production,* v. 102, Sept. 26, 1958, p. 1692-1694.
(G17g, T7a)

534-G. (French.) **Manufacturing Precision Telescope Parts.** A. Blanken. *Machine Moderne,* no. 592, July 1958, p. 17-19.

In the manufacture of precision parts, telescopes are used as alignment instruments, allowing measurements within 0.02 mm. Finish machining and testing of telescope tubes. (G17, X3)

535-G.* **Pivot Polishing.** Walter I. Shanler. *Automatic Machining,* v. 19, Oct. 1958, p. 40-43.

Small precision part is accurately sized (for both diameter and shoulder lengths) and is given an

extremely fine surface finish on a practical basis. Pivot superfinishing is a chip removing operation somewhat related to cylindrical grinding. The grinding wheel itself is replaced by a specially ground carbide or ceramic superfinishing wheel. (G19q)

536-G.* Hot-Sizing Titanium Shapes at Ryan Aeronautical Co. Charles O. Herb. *Machinery,* v. 65, Oct. 1958, p. 122-124.

Use of hot dies and stretch forms insures accurate shape and size of parts made from commercially pure Ti and alloys that are hard to form. (G9, 1-52: Ti)

537-G.* Slicing and Dicing Crystals of Silicon and Germanium. *Machinery,* v. 65, Oct. 1958, p. 128-130.

Si and Ge crystals for application in military, airborne and industrial electronic systems and controls are produced. Methods developed for mass-producing these parts to dimensions of 0.035 in. square by 0.013 in. thick within a tolerance of ± 0.002 in. (G17; Si, Ge)

538-G.* Hot-Sizing Titanium and Heat-Resistant Steel Parts. *Machinery (London),* v. 93, Oct. 1, 1958, p. 762-764.

It is difficult to produce small corner radii in such metals, and when parts have been formed in hydraulic presses, or by drop-hammers, they almost invariably have wrinkled flanges and warped surfaces. To overcome these difficulties, several prototype hot sizing presses have been developed. On these machines, parts are hot sized in less than 8% of the time formerly required for bench working, and dimensional limits of the order of ± 0.003 in. can be maintained. (G9, 1-52; Ti, SS)

539-G.* Glass Lubricants in Metallurgy. L. K. Kovalev and V. A. Ryabov. *Metal Industry,* v. 93, Sept. 26, 1958, p. 249-251. (From *Steklo i Keramika.*)

Glass lubrication is being used increasingly in metalworking, particularly in hot pressing, stamping, boring and in the hot shaping of high-alloy steels, Mo, V, Zr and Ti. (G-general; NM-h, NM-f43)

540-G.* Cold Heading and Upsetting. G. H. Townend and F. B. Wilson. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 353-359.

Methods and machines for production of cold headed parts; suitable materials. Process is widely used in manufacture of fasteners; small bolts, for example, at the rate of 200 per min. The most commonly used material is carbon steel. (G10, 1-67, T7f; CN)

541-G.* Precise Methods Make Transistor Elements. Charles Emerson. *Metalworking Production,* v. 102, Oct. 10, 1958, p. 1789-1790.

Ultra-small pieces of Ge, Si and other semiconductor materials are machined and finished with careful laboratory techniques. Improved methods of cutting and finishing the unusual materials, which are hard and brittle, include slicing thin wafers from a single-crystal ingot with diamond saws; dicing the wafers into tiny squares of material with a single or ganged saws; lapping and polishing the faces of the wafers and dice to a high accuracy; ultrasonic machining faces to special shapes. (G17, T1k; Ge, Si, EG-j)

542-G.* Gun Drilling Solves Concentric Cavity Machining Problem. *Modern Machine Shop,* v. 31, Nov. 1958, p. 150-152.

The part to be drilled was a small disk of cold rolled steel with Zn plating. It required a concentric cavity with 45° sides. A solid carbide-tipped gun drill, 7 in. long, was made with the carbide point sharpened to fit the contours of the depression in the disks. This took advantage of the characteristics of all gun-type tools; free cutting at minimum end pressure, designed to cut to center and use of hard grade of carbide. (G17e; ST)

543-G.* Ultrahigh Speed Machining. Solution to Producibility Problems? Robert L. Vaughn. *Tool Engineer,* v. 41, Oct. 1958, p. 71-76.

Need for new machining methods for aircraft parts; machining variables; reasons for metal failure; plastic deformation in solids; results of experiment with explosive machining at 150,000 ft. per min. were favorable. (G17, G19)

544-G.* Power-Roll Forming: Machining Without Chips. John N. Heater. *Tool Engineer,* v. 41, Oct. 1958, p. 99-102.

Power-roll forming, also called hydrospinning, floturning, flow forming and power spinning, is a fast and accurate method of forming cones, tubes and other shapes. Characteristics and applications of the process as well as basic theory.

Chipless machining is possible with this process, which forms parts to close tolerances by rotary extrusion. (G11, G13)

545-G.* Evaluating the Producibility of Cold-Extruded Parts. R. W. Gardner. *Tool Engineer,* v. 41, Oct. 1958, p. 105-107.

When producibility considerations are taken into account, the ability of the cold extrusion process to shape parts to finished dimensions with few secondary operations can be fully exploited. Points which are important in considering cold extrusion of steel as a manufacturing process are tool design, product geometry or shape, product material and lubrication. Thus, depending upon conditions, cold working is either an advantage or a disadvantage. (G5)

546-G.* (Japanese.) **Forming Gears on Rotary Hot Presses.** M. Naruse. *Metals,* v. 28, Sept. 1958, p. 683-691.

Uncut wheel is heated by high-frequency heater, which consists of circular coil for preheating and of quadrant coils for the working process. Rim of a wheel is heated by 400 kc. alternating current. (G17g)

547-G. Metallic Carbide Tools. G. Villani. *Revue Mecanique,* v. 7, no. 130, 1956, p. 27-33. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1430.)

(G17, T6r, 6-69)

548-G.* Machining Operations on Honeycomb Material. *Machinery (London),* v. 93, Oct. 15, 1958, p. 903-906.

The honeycomb core is attached to a skin or "caul plate" with polyethylene glycol, a water-soluble wax-like material which has excellent gripping properties at room temperature but can be melted and removed from the work by washing in hot water. To machine the honeycomb, a "truck-valve" type of cutter is used. A manually controlled Wadkin router, with a 25-ft. long table; planer-type machine for producing wedge-shaped honeycomb parts. (G17, 7-59)

549-G.* (German.) **Thread Rolling.** Karl Schimz. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 538-544.

Rolling with flat tools, with driven round tools, and with nondriven tools. Changes in material and its properties, suitability of different materials, accuracies obtainable, quality of surface finish, economy of the single methods. 12 ref. (G12)

550-G.* (German.) **Thread Skiving.** Ernst Linsinger. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 545-550.

To calculate the cutting data in thread skiving a simple formula is given for the "Komma-factor", the ratio of the peripheral feed to the maximum thickness of chips. Output investigations based on the volume machined in the time unit, to the choice of the driving motor, the influence of the specific cutting power, choice of the cutting angle, construction of tools, down-cut or climb-cut operations, respectively, demands on the lathe to be used, questions of cooling, the choice of the cutting speed for different materials. (G17f)

551-G.* (German.) **Strip Drawing Operations.** J. Thorwarth. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 572-577.

Follow-on drawing operation for parts having a large diameter, developed from the Oeillet method. Theoretical fundamentals, calculation of a tool for drawing in the single-row strip; comparison of costs with individual drawing method; drawing in multiple-row strips and with freely cut sheet or bars. 5 ref. (G4)

552-G.* (Japanese.) **Behavior of Chips in Steel Cutting.** K. Okushima and K. Minato. *Japan Society of Mechanical Engineers, Transactions,* v. 142, no. 24, 1958, p. 333-339.

Flow-out angle of chip and shape of chip studied for various cutting speeds, thrust and nose radius. Effects of the first two are not appreciable, but the larger the nose radius, the larger the flow-out angle. Chips are classified into the continuous type and the chop type. (G17; ST)

553-G.* (Japanese.) **Researches on Grinding Fluids.** R. Furuichi and Y. Tanaka. *Japan Society of Mechanical Engineers, Transactions,* v. 142, no. 24, 1958, p. 340-345.

Various emulsion-type grinding fluids based on spindle oil studied under various grinding ratios, tangential grinding force, the wearing state of the grinding wheel and the rate of dilution of the grinding fluid. Vacuum annealed spring steel

is used as a test sample. Additives to the fluid are rape-seed oil, paraffin chloride and tri-cresyl phosphate. With the increase of the rate of dilution of the fluid, the grinding ratio decreases and the tangential grinding force and the wearing rate of the grinding wheel increase. (G18; NM-h)

554-G. **Carbide Versus Carbide.** Robert T. Hook. *Automatic Machining,* v. 19, Oct. 1958, p. 45, 46.

After a seven-year study, a company is using premium grade carbide in turret lathes, thus increasing their speed of production with no increase in wear, resulting in a $68,000 saving. (G17a; 6-69)

555-G. **Oxides at Oldsmobile.** *Automatic Machining,* v. 19, Oct. 1958, p. 51-53.

Two production machining operations employing oxide tools are finish turning brake drums and semi-finish turning camshaft bearings. Advantages of using oxide tools and operating data. (G19q; 6-70)

556-G. **High-Speed Piercing Method Slashes Short-Run Costs.** E. J. Egan, Jr. *Iron Age,* v. 182, Oct. 23, 1958, p. 73-75.

New 20-turret punch press, which is fast, flexible and safe, speeded up production of vending machine parts. (G2j, W24p)

557-G. **Machining the "Supermetals".** *Mill and Factory,* v. 63, Sept. 1958, p. 115.

Higher speeds and throw-away cutters have reduced time and tool breakage in machining "superalloy" steels and greatly improved the quality of aircraft and missile parts. (G17, W25r; SS)

558-G. **Effects of Operating Variables on Abrasive Belt Life.** J. M. Pitblado. *Tool Engineer,* v. 41, Oct. 1958, p. 113-116.

(G18, W25c)

559-G.* (German.) **Electric-Discharge Machining of Tools.** Hans Joachim Schulz. *Giesserei,* v. 45, Sept. 25, 1958, p. 615-623.

Describes set-ups for producing spark energy and for adjusting distance between work and tool electrode; method of operation of modern electric-discharge machine tools. Method for determining shape of tool electrodes; methods for manufacture of spark-machining tools and the electric-discharge engraving of a die. Examples of operation of process; economy of the process. 12 ref. (G24a; TS)

560-G.* **Natural Gas for Cheaper Cutting.** William J. Semple. *American Machinist,* v. 102, Aug. 25, 1958, p. 69-71.

Purpose of the tests was to ascertain which type and make of equipment, operating on either natural gas or acetylene, would give the lowest total cost for oxygen cutting while maintaining satisfactory quality. Test setup and procedure; results with the aid of graphs. (G22g; RM-m35)

561-G.* **Types and Properties of Cutting Fluids. Pt. 1.** E. L. H. Bastion. *Canadian Metalworking,* v. 21, Oct. 1958, p. 16, 18, 20, 22, 24, 26.

Historical outline; performance and service properties. Where cooling is the most important requirement, the emulsion or water-based solution is best. High-carbon and hard alloy steels are best machined with chemically active oils containing sulphurized fatty oils. For machining tough, "stringy", low-carbon steel, straight, sulphurized mineral oils are used. In machining tough, ferrous alloys chlorinated or sulphochlorinated oils perform well. (To be continued.) (G17; NM-h)

562-G.* **How Roll Flowing Works. Pt. 2.** Richard E. Paret. *Metal Forming and Fabricating,* v. 20, Oct. 1958, p. 27-28.

Roll flowing produces parts to a predetermined shape by the cold flowing of metal over a mandrel. Blank development and proper balancing of roller pressure and feed are the most important factors. (G13)

563-G.* **Ceramics Prove Themselves on Copy Turning.** *Metalworking Production,* v. 102, Oct. 17, 1958, p. 1820-1821.

A standard copying lathe with a larger motor provides faster cutting speeds and longer tool life with the use of ceramic tools. Properties of ceramic material compared with those of carbide. Ceramic tip holders. (G17a; T6n, 6-70)

564-G.* **Grinding Space Age Materials.** John A. Mueller. *Tool Engineer,* v. 41, Nov. 1958, p. 127-128.

Grinding specifications for silicon carbide, alumina, Zr and Mo. (G19; Si, 6-69, Al, 6-70, Zr, Mo)

565-G.* (German.) **Progress in Machine Finishing, Finishing Lathes and Finishing Drills.** Hermann Schopke. *Industrieblatt,* v. 58, Aug. 1958, p. 333-338.

Procedures and machinery used for surface finish of cylindrical bodies, both inside and outside. Definition of terms; construction and function of horizontal and vertical inside-finishing lathes, horizontal and vertical outside-finishing lathes, multiple spindle machines; profile drill; spindle units, special machines, transfer routes. Fine machining of outer surfaces by ordinary production machinery. (G17a, W25)

566-G.* (German.) **Lapping in Modern Finishing.** Wilhelm Schmid. *Industrieblatt,* v. 58, Aug. 1958, p. 338-341.

Lapping, developed originally to remove very thin surface layers in finishing operations, has gained new importance for other procedures; by careful selection of abrasive grains and proper combination of lapping compounds, it is now possible to remove considerable amounts. Thus, lapping can replace other procedures like grinding, in some cases even milling. The advantage of lapping is better surface quality at the end of operations. Lapping methods, available machinery and most important lapping compounds discussed. Reference is made to the recently developed "beam-lapping". (G19p)

567-G.* (German.) **Drilling With Hard Metal Tools.** Hermann Hardt. *Industrieblatt,* v. 58, Oct. 1958, p. 419-424.

Use of hard-metal tools is no longer restricted to turning, planing and milling, but includes other procedures like drilling and boring. "Spiral drill" as well as a number of drills for special application. Influence of material to be drilled, characteristics of drills, length of time before resharpening, chip removal, accuracy obtained, energy consumption, working speeds, lubrication. Problems encountered in drilling. Suggestions on use of hard-metal cutting tools to best advantage. (G17e, T6n; SGB-q)

568-G.* (German.) **Protruding With Punch (Sheet Metal Work).** R. Wilken. *Werkstatttechnik und Maschinenbau,* v. 48, Aug. 1958, p. 413-420.

Flow of material, effective stresses, most suitable shape of punch, forces necessary for various tools and materials. Size and shape of protruded portion. (G2j)

569-G.* (Italian.) **Factors That Influence Surface Finishes.** Carlo Rosini. *Rivista di Meccanica,* v. 9, June 21, 1958, p. 19-26.

Factors in production of acceptable surface finishes include type of machining operation and machine tool used, tool characteristics, feed, depth of cut, speed, lubricant, characteristics of workpiece. (G17)

570-G.* (Italian.) **Plastic Working of Sheet Steel. Pt. 2. Bending.** Riccardo Levi. *Rivista di Meccanica,* v. 9, July 19, 1958, p. 19-24.

Calculation of development of bends; lengthening and loss of thickness of bent fibers; displacement of undeformed fiber (neutral axis) from centerline of material thickness toward center of curvature; other phenomena associated with bending; bending tests. (G6; ST, 4-53)

571-G.* **Forming Metals at High Velocities.** T. C. DuMond. *Metal Progress,* v. 74, Nov. 1958, p. 68-76.

Capabilities, limitations, 11 different methods of explosive forming. Types of metals to which applied. (G-general; NM-k34)

572-G. **Tooling and Technique Build 880 Jets.** George H. DeGroat. *American Machinist,* v. 102, Aug. 25, 1958, p. 84-87.

An outstanding technique for assembly, which combines adhesive bonding and riveting, was developed to make the wings leakproof and to increase strength and resistance to fatigue. (G17, T24a; Al-b)

573-G. **Chrysler Machines With Job-Tested Oxides.** Ben C. Brosheer. *American Machinist,* v. 102, Nov. 3, 1958, p. 108-113.

Cutting speeds, tool life and quality control were improved compared with carbide bits. (G17, T6w; SGA-j)

574-G. **Ceramics for Machine Tools. Pt. 2.** R. M. Gill and G. Spence. *Ceramics,* v. 9, Sept. 1958, p. 27-31.

Applications, advantages and limitations of modern oxide ceramic tooling in relation to mild steel, cast

iron, gear steel and toolsteel.
(G17, T6n; 6-70, CI, CN, TS)

575-G. Description of Electrolytic Jet Etching of Silicon. Albert Mark. *Electrochemical Society,* Abstract no. 72, May 1957, p. 165-169.

Holes are drilled into Si crystals by high-pressure liquid stream in lieu of a conventional metal drill. (G24b; Si)

576-G. Tool Steel Failures. G. Davitz. *Engineer and Foundryman,* v. 24, Aug. 1958, p. 63-70.

Causes of tool failure which can be avoided by proper choice of steel, correct heat treatment, good design, proper grinding.
(G17, S21; TS, 17-57)

577-G. Cold-Working Relieves Weld Stress, Eliminates Metal Removal. H. L. Meredith. *Industry and Welding,* v. 31, Oct. 1958, p. 76-77, 86.

(G23, F29a; Al-b, 7-51, 3-66, 4-60, 3-74)

578-G. Hot-Cup Cold-Draw Process Forms to Tight Dimensions. R. O. Schulin. *Iron Age,* v. 182, Nov. 6, 1958, p. 110-112.

Artillery shells formed in two-step operation to closer tolerances, better surface finish. Labor, material costs cut. (G4, F22, T2j)

579-G. (Italian.) **Plastic Working of Sheet Steel. Pt. 2. Bending.** Riccardo Levi. *Rivista di Meccanica,* v. 9, July 5, 1958, p. 27-33.

Machines and accessories used for bending operations; feeding attachments; safety measures. (To be continued.)
(G6, W24, A7p; ST, 4-53)

580-G. Special Techniques Help Lick Complex Stainless Shapes. R. H. Eshelman. *Iron Age, v.* 182, Nov. 13, 1958, p. 135-137.

Suggestions for special handling, machining, inspecting of difficult shapes made of high-strength material. (G17; SS)

581-G. Investigation of the Theories of Orthogonal Machining. Tomuya Ota, Akio Shindo and Hidekazu Fukuoka. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 484-493.

7 ref. (G17)

582-G. Titanium, Improved Spot-welding, Forming and Tooling Techniques Being Used. C. P. Smith. *Light Metal Age,* v. 16, Oct. 1958, p. 6-7.

(G-general, K3; Ti)

583-G. Ceramic Milling of Ferrous Materials. Horace Frommelt. *Machine and Tool Blue Book,* v. 53, Nov. 1958, p. 83-90.

Dampening effect of powder metal holders, inserts and bodies.
(G17b, X28m; CI, CN, ST, SGA-j)

584-G. Splitting Tough Steel Cylinders on Fixtured Band Machine. Leo E. Ward. *Machine and Tool Blue Book,* v. 53, Nov. 1958, p. 126-128.

(G17h; ST, 4-60)

585-G. Machining of Cylinders for Air Compressors Simplified. *Machinery,* v. 65, Nov. 1958, p. 133-134.

(G17d; CI, 4-60)

586-G. Cold-Heading. *Metallurgia,* v. 58, Oct. 1958, p. 193-194.

Recent Swiss developments in progressive headers. (G10, W24j)

587-G. Infra-Red Heat Cures Bend Troubles. E. E. Langman. *Metalworking Production,* v. 102, Oct. 24, 1958, p. 1875-1876.

Gas-fired infra-red heaters are used to facilitate forming Mg wing-panel skins which are maintained at a temperature of 400° F. to permit formation of sharp bends in leading edges.
(G9, F21b, T24a; Mg-b)

588-G. Transcript of 1958 Annual Spring Technical Meeting. *Pressed Metal Institute,* 1958, 140 p.

Symposium on cost reduction, die maintenance, modernization and safety in stamping operations. (G3)

589-G. Recent Investigations Into the Blanking and Piercing of Sheet Materials. R. Tilsley and F. Howard. *Sheet Metal,* v. 35, Nov. 1958, p. 817-828.

(G2h, G2-j; ST, 4-53)

590-G. Ultrahigh-Speed Machining: Panacea or Pipedream? A. O. Schmidt. *Tool Engineer,* v. 41, Nov. 1958, p. 105-109.

Criticism of current experiments indicating that speed alone is not a solution. (G17k)

591-G. Ultrasonic Electro-Spark Machining. Pt. 2. Genrokuro Nishimura, Kunio Yanagishima and Toshio Shima. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 237-242.

(G24a)

592-G. Ultrasonic Electro-Spark Machining. Pt. 3. Low Frequency Vibration in Work-Piece. Genrokuro Nishimura and Seiken Shimakawa. *Uni-*

versity of Tokyo, Faculty of Engineering, Journal, v. 25, Mar. 1958, p. 243-246.

(G24a)

593-G. Ultrasonic Electro-Spark Machining. Pt. 4. Low Frequency Vibration in Work-Piece. Genrokuro Nishimura and Seiken Shimakawa. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 247-251.

(G24a)

594-G. Ultrasonic Electro-Spark Machining. Pt. 5. Dimensional Effect and Deep Hole Machining. Genrokuro Nishimura, Kunio Yanagishima and Toshio Shima. *University of Tokyo, Faculty of Engineering, Journal,* v. 25, Mar. 1958, p. 253-259.

(G24a)

595-G. Electrical Diamond Die Drilling. *Wire Industry,* v. 25, Oct. 1958, p. 963, 977.

Primary cone is drilled by high-voltage sparks formed at the point of a needle electrode in contact with the face of the diamond.
(G17e, G24a, W24n; NM-k37)

596-G. (French.) **Rolled and Upset Copper, Brass and Alloy Screw Products.** *Cuivres, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 3-9.

Machine tools, operations involved; advantages, applications of this type of fabrication.
(G10p, T7f; Cu-f, Cu-n)

597-G. (German.) **Finish Machining—Present, Future.** Hans H. Finkelnburg. *Industrieblatt,* v. 58, Aug. 1958, p. 319-327.

Definition of terms (honing, beam-lapping, electro-erosion); operations, applications; recently developed machinery. 10 ref.
(G19, G24)

598-G. (German.) **Economical Use of Grinding Machinery in Continuous Production.** W. Peter. *Industrieblatt,* v. 58, Aug. 1958, p. 327-332.

Two basic methods of cylindrical grinding, and three other methods derived from the two. Applications in different fields, taking continuous production into consideration. Requirements in dimensional accuracy and surface quality. (G18g)

599-G. (German.) **Effects of Grease in Belt Grinding. Pt. 2.** G. Pahlitzsch and M. Magnussen. *Metalloberfläche,* v. 12, Oct. 1958, p. 308-312.

(G18; NM-h)

600-G. (German.) **Thread Grinding.** F. Zimmermann. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 551-556.

(G18k, T7f)

601-G. Free Machining Annealed Grey Iron. A. Whitmore. *British Foundryman,* v. 51, Aug. 1958, p. 385-387.

Excellent free machining qualities are obtained by annealing gray cast irons of a high carbon equivalent value, as the resulting material has a mainly ferritic matrix. Annealing cycles and effect of heat treatment on metallographic structure.
(G17k, J23, 2-64; CI-n)

602-G. New Drawing Process Eliminates Heat Treating for Strong Parts. E. S. Nachtman and E. B. Moore. *Journal of Metals,* v. 10, Apr. 1958, p. 281-284.

Heat treating with attendant processing steps (straightening, descaling, etc.) eliminated in the production of many parts by introduction of a medium-carbon steel bar (C-1144) produced by elevated-temperature drawing. 4 ref.
(G4, Q-general, 2-62, 3-68; ST, 4-55)

603-G. Boron Steel for Deep Drawing. L. R. Shoenberger. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 402-405.

Hot tearing and boron analysis procedures overcome. Boron semi-killed steel reveals structures and mechanical properties not found in low-carbon steels. 8 ref.
(G4b, Q-general; ST-k, *B, Al*)

604-G. Automatic Line Tracing in Oxygen Shape-Cutting Machines. A. F. Chouinard and E. L. McDonald. *Welding Journal,* v. 37, Oct. 1958, p. 988-990.

Motion of torches is controlled automatically by electronic line tracer following lines of ordinary pattern drawings rather than black-white edges on specially prepared edge patterns or templets. (G22g)

SECTION H

POWDER METALLURGY

1-H. Evaluation of Titanium Powder for Metallurgical Use. Craig T. Waldo. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-CTW-1, Apr. 25, 1956, 15 p. (CMA)

Titanium powders from six sources were cold pressed, sintered, hot rolled, pickled and machined. Test data were obtained for hardness, bending, tensile strength and microstructure. Vacuum system used in the study. (H12; Ti)

2-H. Powder Metallurgy as an Aid to Production Engineering. G. R. Bell and L. M. Maricchi. *Engineer and Foundryman,* v. 22, Aug. 1957, p. 54-60.

Applications and production presses. (H general, 1-72)

3-H. (German.) **History of Metal Powders.** F. M. Feldhaus. *Planseeberichte für Pulvermetallurgie,* v. 5, Aug. 1957, p. 54-55.

9 ref. (H general, A2)

4-H.* Preparation of Uranium and Uranium Alloy Powder Metal Compacts. Herbert S. Kalish. *American Society for Metals, Transactions,* v. 51, Preprint no. 63, 1957, 22 p.

Uranium parts have been made by cold pressing and sintering, hot pressing and powder rolling. Hot pressing appears to be the most favorable for unalloyed uranium, yielding fine grain size, random orientation uranium parts, and is amenable to the fabrication of slugs and hollow cylinders. Cold pressing and sintering appear most promising for making uranium alloy parts. (H14, H15; U)

5-H.* Sweden: Iron Powder to Rolled Steel in One Operation. Bo Kalling, Sven Eketorp and Sven Backstrom. *Journal of Metals,* v. 9, Nov. 1957, p. 1440-1444. (From *Jernkontorets Annaler,* v. 141, no. 6, 1957, p. 317-330.)

The Stora powder steel process developed by Stora Kopparbergs Bergslags A/B, Sweden. Granulated pig iron is decarburized with iron oxide, and the low-carbon product is rolled directly to compact steel. 11 ref. (H10c, H14j; Fe, ST)

6-H.* Vacuum Sintering. Pt. 2. Henry H. Hausner. *Precision Metal Molding,* v. 15, Nov. 1957, p. 91-92, 94-95.

Effects of sintering atmosphere on porosity and pore migration in Cu powders. Experiments show that vacuum sintering not only affects the density and total porosity but especially the distribution of pores of various sizes throughout the sintered compact. Pore-size distribution determines the grain structure. (To be continued.) (H15, 1-73, H11; Cu, 6-70)

7-H.* Introducing Commercial Titanium Powder. Alfred R. Globus. *Precision Metal Molding,* v. 15, Dec. 1957, p. 38-39, 79.

New UniFide Ti powder of United International Research Inc. is stable and shows no tendency to spontaneous combustion. Unlike powder made from Ti sponge this powder consists of tiny individual particles offering excellent compressibility. 4 ref. (H10; Ti)

8-H.* Vacuum Sintering. Pt. 3. Henry H. Hausner. *Precision Metal Molding,* v. 15, Dec. 1957, p. 44-46, 69.

Comparison of A-sintered and vacuum sintered Be campacts. Effect of sintering temperature on density and electrical resistivity; effect of compacting pressure on the pressed density of compacted Zr and Zr

hydride powders. 16 ref.
(H15, 1-73, H12; Be, Zr)

9-H. Titanium Carbide. J. C. Redmond. *Product Engineering,* v. 28, Nov. 11, 1957, p. 84-86. (CMA)

Powder metallurgy techniques. (H general, P general, Q general; Ti, 6-69)

10-H. How to Give Powdered Metals Strength. *Steel,* v. 141, Nov. 25, 1957, p. 110-111, 114.

By filling pores with another metal, notch effects are eliminated. Physical properties controlled by varying conditions and materials. (H16e; ST, Cu)

11-H.* Cermets: Pt. II. Wettability and Microstructure Studies in Liquid-Phase Sintering. N. M. Parikh and M. Humenik, Jr. *American Ceramic Society, Journal,* v. 40, Sept. 1, 1957, p. 315-320.

The microstructures of polyphase, heterogeneous systems, sintered in the presence of a liquid phase, are analyzed on basis of wettability and surface-energy relations. General principles relating to primary factors affecting microstructure. Application of these principles to such diverse systems as metal-carbide, metal-glass, metal-metal show that the microstructure and distribution of the solid in liquid is primarily determined by various surface-energy relationships. A general "coalescence hypothesis" based on this work is proposed. 7 ref.
(H15, P13h, M27; 6-70)

12-H.* Activated Sintering. M. Eudier. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 5-9.

Activated sintering involves the use of a highly reactive vapor to accelerate the complete sintering of the metal particles. This process is useful not only for increasing the physical properties of sintered metal but also for accelerating the formation of homogeneous alloys from mixed powders during the sintering operation. 6 ref. (H15n)

13-H.* Production and Characteristics of Chemically Precipitated Nickel Powder. K. O. Cockburn, R. J. Loree and J. B. Haworth. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 10-24.

Processes at Sherritt Gordon Mines Ltd., Fort Saskatchewan, for leaching, Cu removal, Ni reduction. Nickel powder handling, characteristics of Sherritt Ni powder, properties and place of Ni in powder metallurgy. 11 ref. (H10, H11; Ni)

14-H.* Production and Characteristics of Chemically Precipitated Copper Powder. Vanston H. Ryan and Henry J. Tschirner. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 25-32.

Leaching, purification, reduction and powder washing, drying and crushing, types of powder produced, physical tests on Cu powders and an analysis of the physical properties of Cu powders produced at Whitaker Metals Corp., Kansas City, Mo. (H10, H11; Cu)

15-H.* Current Developments in the Rolling of Both Ferrous and Nonferrous Powders. John D. Shaw and Walter V. Knopp. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 33-41.

Production of continuous strip from metal powders. Thickness of strip; green density of strip; sintering of green compacted strip; comparison of hot and cold rolling; effect of variables and powder rolling; properties of typical powders used in rolled strip. 5 ref. (H14j, H11)

16-H.* Fiber Metallurgy. Cord H. Sump and William Pollack. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 42-48.

Manufacture of fiber metal in sheet form. Felting and matting of metal fibers; optimum sintering temperature; tensile strength and mechanical properties of stainless steel wool. (H17; SS, 4-62)

17-H.* Superfine Iron Powders. Michael W. Freeman and John H. L. Watson. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 112-124.

Electron microscopic studies of crystal structure to determine the nature of submicron particles. 9 ref. (H11g, T11h, M26; Fe)

18-H.* Sintering of Iron-Copper-Carbon Compacts. P. Ulf Gummeson and Lennart Forss. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 1, 1957, p. 131-137.

Factors affecting results; effect of additions on dimensional changes, hardness, rupture strength. (H15, Q general; Fe, Cu, C)

19-H. Compacting and Sintering Characteristics of Horizons Inc., and Carborundum Co. Zirconium, and

Electro Metallurgical Titanium Powders. J. R. Pekoke. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-JRP-1, May 11, 1956, 9 p. (CMA)

(H11n, H15; Ti, Zr)

20-H. Manufacture of Hafnium Metal Powder by the Hydride Process. R. N. Honeyman. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-RNH-2, Sept. 5, 1956, 4 p. (CMA)

(H10c; Hf)

21-H. Proposed System for the Manufacture of Hafnium Metal Powder by the Hydride Process. R. N. Honeyman and G. R. Kingsbury. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-RNH-3, Sept. 13, 1956, 8 p. (CMA)

(H10c; Hf)

22-H. (German.) **Physics, Processing and Testing of Powder Metal Parts.** Helmut Gsken. *Industrie Anzeiger,* v. 79, Aug. 20, 1957, p. 1003-1004.

(H general)

23-H.* Future Potentials for Powder Metallurgy of Titanium. Arthur D. Schwope. *Metal Progress,* v. 72, Dec. 1957, p. 156, 160-161. (Digest from "Present Limitations and Future Potentials of Powder Metallurgy", ASM Titanium Conference, Los Angeles, Mar. 25-29, 1957.)

The products of both the Na and Mg reduction of Ti tetrachloride have yielded fines which are relatively pure. Implications of a fine, pure powder are that the more normal powder processing techniques can be used and that thinner cross sections can be obtained in the pressed article. (H general; Ti)

24-H. (Russian.) **Analogy Between Sintered and Hot Pressed Metallo-Ceramic Materials.** M. K. Ribalchenko. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 24-27.

Both materials were tested for physical properties and yielded similar results. (H14h, H15)

25-H.* Powder Metallurgy. Technique and Applications. *Metallurgia,* v. 56, Dec. 1957, p. 271-275.

Production and testing of metal powders and the manufacture of articles from them by compaction and sintering. Included in the applications mentioned are a number of engineering components which could not be made by conventional metallurgical techniques. (H general)

26-H. Bigger Powdered Bearings. *Steel,* v. 141, Dec. 23, 1957, p. 72.

Problem of making outsized, self-lubricating bearings solved by joining sections of powdered metal with Ag solder. (H16, K7, T7d; Ag)

27-H. Dispersed Hard Particle Strengthening of Metals. N. J. Grant and O. Preston. Massachusetts Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131221, Nov. 1956, 34 p. $1.

Theoretical aspects of hardening and strengthening; problems encountered in powder metallurgy of the various processes. (H11; Cu, Al, Ni, Be)

28-H. Reduction Structures of Iron Powders. J. O. Edstrom. *Jernkontorets Annaler,* v. 140, no. 2, 1956, p. 116-129. (Henry Brutcher Translation no. 3886, Altadena, Calif.)

Previously abstracted from original. See item 79-H, 1956. (H10, H11, Fe)

29-H.* (German.) **Oxidation of Pyrophoric Iron Surfaces.** Friedrich Erdmann-Jesnitzer and Gunter Wieghardt. *Werkstoffe und Korrosion,* v. 8, Nov. 1957, p. 669-673.

Storage of powdered pyrophoric iron under commercial nitrogen does not decrease tendency to oxidize. Decrease of pyrophoric characteristic is due to traces of oxygen present in the nitrogen which causes formation of an oxide layer. 8 ref. (H11q; Fe)

30-H.* (Italian.) **Some Fundamental Aspects of Powder Metallurgy.** Giovanni Baralis. *Ingegneria Meccanica,* v. 6, Oct. 1957, p. 25-33.

Review of principal methods of producing metal powders and their most important applications; factors influencing properties of powders and quality of objects made from them; perspectives for powder metallurgy. (H general)

31-H.* (Italian.) **Powder Metallurgy. Pt. 1. What Powder Metallurgy Is.** Neri Corsini. *Rivista di Meccanica,* no. 171, Oct. 12, 1957, p. 7-12.

Origin and development of powder metallurgy; applications in production of structural machine parts. (To be continued.) (H general)

32-H. High Density Boosts Strength. *Chemical and Engineering News,* v. 36, Jan. 13, 1958, p. 45-46.

New process uses special powders to make iron and steel powder parts with higher density. (H general; Fe)

33-H.* (Italian.) **Manufacture of Hard Metal Under Absolute Vacuum.** *Macchine,* v. 12, Oct. 1957, p. 1027-1037.

Process used by Continental Tool Co., Arnhem, Germany, for production of its new product "Sintronic". (H general, 1-73; EG-d)

34-H. (Russian.) **Pressing and Sintering of Cermet Compositons Containing Copper.** T. N. Znatokova and V. I. Likhtman. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 511-518.

Process of pressing and sintering of copper-graphite, copper-tin and copper-tin-graphite compositions. 11 ref. (H14, H15; Cu, Sn, 6-70)

35-H. (Book.)**Metal Powder Association, Proceedings, 13th Annual Meeting,** v. 1, 1957, 147 p. Metal Powder Association, 130 W. 42nd St., New York 36, N. Y.

Collection of 16 papers read at Chicago, Apr. 30 to May 1, 1957 covering theory, practice and applications. Each paper abstracted separately. (H general)

36-H. High Heat Resisting Aluminum. R. Irmann. *Canadian Metalworking,* v. 20, Dec. 1957, p. 38-39.

Properties and other qualities of sintered Al powdered metal. (H general, Q general; Al, SGA-h)

37-H. Magnetic Tape Rolled From Powdered Metals. C. E. Richards. *Electrical Manufacturing,* v. 60, Dec. 1957, p. 104-109.

Production of magnetic alloy strip by sintering mixed powders and cold rolling the billets. 7 ref. (H14j; SGA-n)

38-H.* Copper-Silica and Copper-Alumina Alloys of High-Temperature Interest. Klaus M. Zwilsky and Nicholas J. Grant. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1197-1201.

Alloys containing up to 10 Vol. % of oxide were made by utilizing relatively coarse Cu powders and several sizes of silica and alumina powders. The alloys were prepared by mechanical mixing of powders followed by cold hydrostatic pressing, sintering and hot extrusion. (H general; Cu, *Al, Si,* SGA-h)

39-H. Report on Powder Metallurgy in the U. S. S. R. Henry H. Hausner. *Metal Progress,* v. 73, Jan. 1958, p. 105-108, 196.

"Self criticism", Russian style, of the knowledge and practice of powder metallurgy as of 1953, calls attention to deficiencies in meeting the aims of the last five-year plan. Indications in subsequent literature show that many of these deficiencies are being rapidly corrected. (H general)

40-H.* Making Strip Metal From Metallic Powder. William N. Hayden, John D. Shaw and Walter V. Knopp. *Precision Metal Molding,* v. 16, Jan. 1958, p. 48.

Powder is fed to a rolling mill where it is compacted to less than full density, but into strip strong enough to be handled. From the mill, it may be rolled into coils for batch annealing, or may be fed directly onto the belt of a continuous sintering furnace. The operations which follow sintering, such as annealing, and cold or hot re-rolling, etc., adhere to standard practices. (H14j, H15)

41-H. How to Give Powdered Metals Strength. *Steel,* v. 141, Nov. 25, 1957, p. 110-114.

Iron or steel powdered compacts are infiltrated with melted copper. Data on heat treatment and physical properties. (H16e; Fe, ST, *Cu*)

42-H. (German.) **Production of Large Hard Metal Rings and Other Products by Sintering.** E. Bryjak and W. Missol. *Fertigungstechnik,* v. 7, Dec. 1957, p. 557-561.

Values for the density and the hardness comply with data in literature. (H14, Q29n, P10a)

43-H. (German.) **Electrolytic Production of Metallic Powder.** Wladislaw Tabor. *Chemische Technik,* v. 9, Nov. 1957, p. 645-649.

Electrowinning of Cu, Ni, Fe and Ag powder. (H10b; Ag, Cu, Fe, Ni)

44-H. (German.) **Substitution of Iron-Nickel Binder for Cobalt in Sintered Hard Metals.** R. Hohlesmann and R. Wehner. *Die Technik,* v. 12, Nov. 1957, p. 736-740.

Exchange is possible without a decrease in hardness, toughness and wearing resistance of alloy. 11 ref. (H15; SGA-q, *Fe, Ni, Co*)

45-H. (German.) **Powder Metal Parts.** Gerhard Zape. *Feinbearbeitung,* v. 23, 1957, p. 1-84.

Manufacture of powder metals, their properties and applications. (H general)

46-H.* Production and Uses of Aluminium Powder and Paste. V. J. Hill. *Metallurgia,* v. 57, Feb. 1958, p. 75-78.

Methods for production of finely divided Al. Properties and applications of both granular and flake forms, with particular reference to the influence of flake size and shape and of the choice of vehicle on the characteristics of Al paints. 4 ref. (H10, T29c, 17-57; Al)

47-H. (English.) **Sintered Beryllium. Pt. 2. Test Making of Beryllium Plate.** Hiroshi Nakatani and Tsuneo Narikawa. *Electrotechnical Laboratory, Bulletin,* v. 21, Dec. 1957, p. 881-884.

Fabrication of ductile Be by powder metallurgy methods, applying small compacting pressure. The density of sintered specimens is 95% of theoretical value. (H14; Be)

48-H. (Hungarian.) **New Industrial Permanent Magnet Materials.** Ferenc Bartfai. *Kohaszati Lapok,* v. 12, July 1957, p. 311-316.

Production of micro and other magnets by powder techniques. 22 ref. (H-general, T1; SGA-n)

49-H. Sintered Metals Approach Properties of Wrought Alloys. *Iron Age,* v. 181, Jan. 23, 1958, p. 88-90.

Low-cost grades of commercial iron powders are converted by single press-sinter operation into high-stress parts which would cost four times as much if machined with present methods.
(H14, H15, Fe, ST, SS)

50-H.* (German.) **Production and Properties of Semifinished Tantalum Products.** Jiri Vacek. *Neue Hütte,* v. 2, Nov. 1957, p. 692-702.

Pressing of Ta powder; sintering; vacuum and temperature measurement; spectral analysis of the gases; vacuum installation; deformation of the sintered bars; waste treatment. 21 ref. (H-general; Ta)

51-H. (German.) **Theory and Practice of Soviet Powder Metallurgy.** W. S. Rakowski. *Neue Hütte,* v. 2, Dec. 1957, p. 764-767.

Study of sintering process with aid of isotopes; influence exerted by sound oscillations; large porous iron railway bearings.
(H15n, T7d; Fe, 6-71)

52-H.* (German.) **Manufacture and Properties of Sintered Stainless Steel.** Friedrich Eisenkolb. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 141-148.

Powders made from 18-8 steel by intergranular disintegration, atomization and jet atomization. Grain size, shape, pressing and sintering characteristics. Effects of pressure, sintering time and temperature, furnace gases, addition of 0.1-0.3% boron, 1.0-1.5% red phosphorus and 0.1-0.6% phosphorus from ferrophosphorus. Corrosion. Mechanical properties of powder of different grain size and of compacts containing 25% Ni. 26 ref.
(H10, H14, H15, Q-general; SS)

53-H.* (German.) **Effect of Boron on Formation of Liquid Phases in Sintered Steel.** Friedrich Benesovsky and Werner Hotop. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 149-152.

Mechanical properties and structure of samples, sintered 1 hr. at 1100° C., made of carbonyl, Hametag, sponge and RZ iron powders prepared with 0-10% alloy containing 0.3% C, 3.4% Si, 4.2% B, 18% Cr, 2.1% Fe and 72% Ni. Mechanical properties of samples sintered 2 hr. at 1250° C., made of steel containing 18% Cr, 8% Ni, with 0-10% Ni-Cr-B alloy. Scaling resistance. 11 ref. (H15, Q-general, R2q, 2-60; ST, AY, *B*)

54-H. Iron Powder Made by the H-Iron Process. Jerome F. Kuzmick and Kenneth W. Bruland. *Metal Progress,* v. 73, Mar. 1958, p. 92-96.

Magnetite concentrate of high purity is reduced by hydrogen (97% purity) at 400 psi. and 1000° F. to prevent reoxidation. Hydrogen is made from the coke oven gas. Various grades of iron powder are suitable for molding, for a chemical reagent, and for high-grade melting stock. (H10c; Fe)

55-H. Powder Metallurgy of Uranium and Uranium Alloys. John L. Zambrow. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 117-121.

5 ref. (H-general; U)

56-H. Fabrication of Bulk Form Uranium Dioxide for Use as Nuclear Reactor Fuel. J. Glatter. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 131-134.

Slip casting, hydraulic extrusion and cold pressing processes. Effect of mechanical comminution and addition of titanium dioxide on the density of sintered rods.
(H14, H10e, H11k, T11g; U)

57-H.* Fabrication of High-Density Uranium Dioxide Fuel Components for the First Pressurized Water Reactor Core. T. J. Burke, J. Glatter, H. R. Hoge and B. E. Schaner. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 135-143.

Procedures and equipment used in mechanical agglomeration of the uranium dioxide powder, compaction in automatic presses and sintering; variation of final sintered density with compacting pressure, sintering time, and sintering temperature. (H14, H15, H11k, T11g; U, 14-68)

58-H. (German.) Production of Sintered Iron-Phosphorus Alloys. G. Blum. *Fertigungstechnik,* v. 7, Nov. 1957, p. 504-507.

(H-general; Fe, *P*)

59-H. (German.) Particle Size and Lattice Distortion of Powdered Tungsten and Tungsten Carbide. H. Hendus, W. Dawihl and G. Bartsch. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 615-624.

Determination by X-ray and electron microscopy (Hall's method). Influence of carburization and grinding duration. (H11j, M21e, M21f; W, 6-69)

60-H. (Russian.) Forty Years of Soviet Powder Metallurgy. M. Yu. Bal'shin and G. V. Samsonov. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 15-25.

33 ref. (H-general)

61-H.* Powder Metallurgy. Pt. 9. J. F. C. Morden. *Metal Industry,* v. 92, Jan. 17, 1958, p. 43-46.

Sintering of Fe and Cu using salt and liquid metal baths for heating. Sintering of W, Mo, Ta, Ti and Zr by high-frequency induction with or without vacuum. Physical properties of resulting alloys. (H15)

62-H. Hot-Pressing of Electrolytic, Dehydrided, and Calcium-Reduced Thorium Powders. R. H. Witt and H. M. McCullough. Sylvania Electric Products, Inc. *U. S. Atomic Energy Commission,* SEP-224, Sept. 11, 1956, 37 p.

6 ref. (H14h, H11; Th)

63-H.* (German.) Iron-Copper-Graphite Sinter Materials. P. U. Gummeson and L. Forss. *Planseeberichte für Pulvermetallurgie,* v. 5, Dec. 1957, p. 94-101.

Results of investigation on powdered iron with addition of graphite and copper. Carbon-copper sinter steels have some advantages, especially hardness, strength and gage stability. They are not susceptible to fluctuation of sinter atmosphere. Ductility is somewhat low. (H-general, Q-general; Fe, *Cu,* NM-k37)

64-H.* (German.) Uranium Alloys Sintered by Impregnating Process. R. Kieffer and K. Sedlatschek. *Planseeberichte für Pulvermetallurgie,* v. 5, Dec. 1957, p. 104-120.

Impregnation technique. Methods for using slightly wettable and slow impregnating combinations. Porous sinter bodies of metals, carbides, borides, nitrides and silicides. (H16d, H15; U)

65-H.* (German.) Investigation of Sintering and Recrystallization Processes. W. Rutkowski. *Neue Hutte,* v. 3, Jan. 1958, p. 37-43.

In two binary systems—Cu-Fe and Cu-W — microhardness, electrical resistance, bending strength, specific weight and oscillation were tested. Influence of added oxides. Recrystallization theory and experiments with recrystallization of pure Ag and of Ag with added W. (H11, H15, N5; Cu, *Fe, W, Ag*)

66-H. Cermets; Production and Testing. *Industrial Heating,* v. 25, Apr. 1958, p. 791-796.

Process whereby the components of a thermite are pressed into a desired shape and ignited to form a cermet. (H-general, 6-70)

67-H. (German.) Porous Powder Metals. Fabrication and Use. R. Palme. *Metall,* v. 12, Jan. 1958, p. 28-32.

27 ref. (H-general, 6-71)

68-H.* (German.) Connecting Aluminum to Copper by Liquid Phase Sintering of Al-Cu Powder. F. Erdmann-Jesnitzer and A. Arnold. *Metall,* v. 12, Mar. 1958, p. 179-185.

Experiments to determine the influence of various factors on durability. Most favorable results obtained at 600 C. with sinter pressure of 0.25-0.50 kg. per sq. mm. and sintering duration of 6 min. Influence of surface property, particle size and flux evaluated. 12 ref. (H15, H16e; Al, Cu)

69-H. (German.) Sintered Parts. G. Zapf. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 38-41.

(H15)

70-H. Porous and Infiltrated Metal. Pt. 1. Powder Metallurgy Applications, Bearings, Fundamentals of the Process. Pt. 2. Iron-Copper Materials, Sintered Iron Bearings, Sintered Components. J. E. Elliott.

Metal Industry, v. 92, Apr. 11, 1958, p. 293-296; v. 92, Apr. 18, 1958, p. 307-309.

(H-general, H16e, T7d; 17-57, Fe, Cu)

71-H.* Consolidation of Molybdenum by Powder Metallurgy Practice. Howard Scott, W. A. Taebel and D. D. Lawthers. Paper from "The Metal Molybdenum", American Society for Metals, p. 51-79.

Molybdenum powder is quite vulnerable to contamination by air. The contaminants, chiefly oxygen and water vapor, have detrimental effects on the mechanical properties of the consolidated metal. Oxidation characteristics of Mo were studied to determine the conditions for pressing and sintering with minimum contamination. 7 ref. (H14, H15; Mo)

72-H.* Powder Metallurgy Molybdenum-Base Alloys. Robert I. Jaffee. Paper from "The Metal Molybdenum", American Society for Metals, p. 330-364.

Major difference between Mo-base alloys prepared by powder metallurgy and those produced by arc-casting is the superior hot breakdown fabrication characteristics of the powder metallurgy product. This is due to the finer initial grain size of the as-sintered alloy. Impurities are distributed over a much larger grain boundary area. Therefore, powder metallurgy alloys may be forged or rolled directly from the as-sintered condition and do not require the initial extrusion operation necessary for arc-cast material. 4 ref. (H-general, F22, F23; Mo)

73-H. Pressure Correlations in the Production of Hard-Metal Powder Compacts. A. G. Samoilov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 2, Feb. 1957, p. 159-162. (Henry Brutcher, Altadena, Calif., Translation no. 4071.)

Previously abstracted from original. See item 83-H, 1957. (H14; W, 6-89)

74-H.* (German.) Compound Materials (Cermets) Made of Aluminum Oxide and Iron or Iron Alloys. Werner Jellinghaus and Toshimori Shuin. *Stahl und Eisen,* v. 78, Apr. 3, 1958, p. 419-429.

Fine-grained powder mixtures; pressing, sintering; density, structure, tensile, creep and impact strength; permeability of materials poor in oxides. Properties of oxide-rich materials; scaling resistance, electrical resistance. Effect of Ni, Cr and Mo additions on strength at elevated temperatures of Fe-Al oxide materials. 16 ref. (H-general; Al, Fe, 6-70)

75-H.* (German.) Relation Between Particle Size, Depth of the Magnetically Heterogenous Surface Layer, Coercive Force and Saturation Magnetization of Carbonyl Iron and Magnetite Powders. Karl Torkar, Othmar Scheikl and Heinrich Egghart. *Archiv für das Eisenhüttenwesen,* v. 29 , Feb. 1958, p. 139-146.

Carbonyl iron powder of 0.0117 and 0.1-micron particle size and magnetite powder between 1 and 827-micron particle size were investigated as to coercive force and saturation magnetization. The maximum coercive force was found to be 160 for carbonyl iron and 110 Oe. for magnetite, originating from crystal anisotropic properties. These maxima were found to exist at particle sizes of 0.01 micron for carbonyl iron and at 1 micron for magnetite. 19 ref. (H11h, H11p; Fe)

76-H.* Gas Desorption of Copper Powders. J. C. Tobin and M. J. Sinnott. *AIME Transactions,* v. 212, Apr. 1958, p. 167-171.

Technique for collecting and analyzing the small quantities of gases desorbed on heating metal powders. Gases collected from Cu powders of various types of manufacture contain H_2O, CO_2, and SO_2. Source of the gas traced to surface films on the powder. 8 ref. (H11q; Cu)

77-H. Use of Nickel-Silver Powder Increasing in Low-Cost, High-Production Powder Metallurgy Industry. *Inco,* v. 27, Apr. 1958, p. 21-23.

Pressed metal parts offer cost savings, high production rates, accuracy and varied applications. (H-general, 17-57; Ag, Ni)

78-H.* Porous and Infiltrated Metal. J. E. Elliott. *Metal Industry,* v. 92, Apr. 25, 1958, p. 334-336.

Porous iron infiltrated with molten Cu increases tensile strength and elongation substantially. Sintered bronze filters, composed of spherical powder particles can be made with a wide range of filtering performance. (H16e; Fe, Cu)

79-H.* Atomized Powder Alloys of Aluminum. R. J. Towner. *Metal Progress,* v. 73, May 1958, p. 70-76, 176.

When molten Al alloys, for example 8% iron, are atomized, the fine powder can be compacted and

extruded into metal parts with superior strength and structure stability at 400 to 800° F.
(H10f, Q-general, 2-62; Al)

80-H.* Fiber Metallurgy. R. H. Read, W. Pollack and S. W. McGee. *Precision Metal Molding,* v. 16, Apr. 1958, p. 25-26, 53, 58.

Fiber sources, metal fiber felting, pressing, sintering, rolling, press forming, machining and impregnating processes in production of fiber metal parts. Applications of fiber metal. (H17)

81-H. 7th Annual Powder Metallurgy Directory. Advances in Powder Metallurgy. *Precision Metal Molding,* v. 16, Apr. 1958, p. 67-68, 91.

Suppliers of equipment and materials for the industry comment on developments in powder metallurgy. (H-general)

82-H. (English.) **A Study of CrB Cermet.** Riitsu Takagi, Kiyoshi Tamura and Yoshio Tamura. *Journal of Mechanical Laboratory of Japan,* v. 3, 1957, p. 96-98. (From *Journal of Mechanical Laboratory,* v. 11, p. 140.)

Experimental vacuum, hot pressing of chromium-boron powder with or without 10% Ni. Chromium boron pressed at 700° C. obtained densities of 99.5% of theoretical value. Oxidation resistance and thermal shock resistance of cermet. (H14h, 1-73; Cr, B, 6-70)

83-H. (Rumanian.) **Utilization of Scrap From Rolling Process for the Construction of Machine Parts by Powder Metallurgy.** A. Domsa and G. Müller. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 79-86.

(H-general; RM-p)

84-H. (Rumanian.) **Employment of Lubricants in the Pressing of Metal Powders.** A. Domsa, V. Moldovan and V. Nicolae. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 87-98.

5 ref. (H14; NM-h)

85-H. (Rumanian.) **Electrolytic Method of Obtaining Metal Powders.** L. Atanasiu and A. Calusaru. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 337-350.

An experimental study of the transition from the compact to the powder form in the electrolytic deposition of Cu, Au and Cd as a function of the electrode potential. Micrographic studies of these powders. 10 ref. (H10b; Cd, Cu, Au)

86-H. (Japanese.) **Soviet Powder Metallurgy.** Y. Hara. *Metals,* v. 28, Apr. 1958, p. 265-269.

15 ref. (H-general)

87-H. (Rumanian.) **Application of High-Frequency Induction to the Sintering of Metal Powders, Especially Refractory Powders.** A. Domsa, G. Muller, T. Bereczki and S. Kovacs. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 113-120.

5 ref. (H15n, W28s)

88-H. Complex Powder Metal Parts Call for Higher Density. S. Bradbury. *Iron Age,* v. 181, June 5, 1958, p. 124-125.

(H14g, H11k)

89-H.* Sintered Metal and Cermet Friction Materials. *Metallurgia,* v. 57, May 1958, p. 247-250.

Sintered metal linings are produced by the compression and partial fusion of very fine particles, mainly of powdered metals. Their physical properties, derived from their constituent metals, give them, under certain conditions of high unit loading, longer life and more stable friction than asbestos-based materials. (H14, H15, Q9p)

90-H.* (German.) Synthetic Solid Bodies. Pt. 2. Influence of Surface Layers Such as Oxide Films on Sintering of Metals. Martin Clasing. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 69-75.

Tensile strength, fracture, strain, hardness and density of sintered Cu powders were observed under varying conditions as to degree of preoxidation, grain size, sintering temperatures and sintering time under vacuum. Strength of the sintered material was improved through thin oxide films. The oxygen of the film is dissolved in the early stage of the process thus leaving a highly active surface structure which in turn enhances the welding action among particles. 8 ref.
(H15, Q-general; Cu, 6-72)

91-H. (English.) **Sintering of Multi-Phase Bodies. Pt. 3. Sintering of Mixtures Containing Low-Melting-Point Powders.** B. Ia. Pines, A. F. Sirenko and N. I. Sukhinin. *Soviet Physics, Technical Physics,* v. 2, 1958, p. 1763-1772. (Translation by American Institute of Physics.)

Contraction of samples of single-component powders (copper) depends to a great extent on the initial porosity and the compression

pressure (presence of closed pores filled with gas). As the compression pressure increases the amount of contraction first decreases but later the curve changes sign (i.e., contraction is replaced by "growth" and increase of the dimension of the samples after sintering takes place). "Growth" occurs whenever the pressure of the gas in the closed pores in the heated samples exceeds the "negative" capillary pressure acting at the surface of the pores. 5 ref. (H15; Cu)

92-H.* (French.) **Study of Metallic Cobalt Powders Obtained by Pyrolysis From Normal Alcanoates.** Claude Moreau and Georges Rodier. *Comptes Rendus,* v. 246, Mar. 24, 1958, p. 1861-1864.

Preparation of metallic Co of variable texture by thermal decomposition in controlled atmosphere of anhydrous salts of fatty acids of the $(RCOO)_2Co$ type; measurement of specific surface of powders, radiocrystallographic study and electron microscope examination. 6 ref. (H10c; Co)

93-H.* (German.) **State of Development of Technique for Producing Sintered Parts of Complicated Shape.** H. Silbereisen. *Fertigungstechnik,* v. 8, Apr. 1958, p. 163-169.

Increased production of sintered parts through application to more complicated shapes could be obtained through improvements in materials and techniques employed in the sintering process. Methods for obtaining these improvements and prospects for new fields of application. (H-general)

94-H. Powder Metallurgy Scores Impressive Gains. Andrew W. Shearer. *Automotive Industries,* v. 118, Apr. 15, 1958, p. 54-56, 116-118, 120.

Applications in the automobile industry. (H-general, T21, 17-57)

95-H. (English.) **Preparation of High Purity U^{233} and U^{235} Powders.** *Soviet Journal of Atomic Energy,* v. 3, no. 9, 1957, p. 1072-1073. (Translation by Consultants Bureau, Inc.)

Powders of these isotopes are obtained by reducing uranium dioxide by means of calcium in a reaction vessel. Metallic powder yield is 97-98% from the dioxide. Yield obtained by hot pressing of parts consisting of these powders is greater than 99%. (H10c, H14h; U, 14-63)

96-H. Direct Rolling of Steel Sheets From Granulated Pig-Iron. B. Kalling, S. Eketorp and S. Backstrom. *Iron and Coal Trades Review,* v. 176, Feb. 28, 1958, p. 495-500. (From *Jernkontorets Annaler,* v. 141, no. 6, 1957, p. 317-331.)

Previously abstracted from original. See item 73-H, 1957. (H14j; Fe, ST)

97-H. Sintered Aluminium S. A. P. F. Bollenrath. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development,* Report no. 103, Apr. 1957, 18 p.

Methods used by the Aluminium-Industrie A. G., Neuhausen, allow the fabrication of sintered bodies from pure Al powder containing limited percentages of aluminum oxides. 7 ref. (H-general; Al)

98-H.* Compacting of Powders Using Molds Made From Reversible Gels. T. W. Penrice. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 1-6.

Plasticized polyvinylchloride in gel form is placed around the die pattern. The gel is sufficiently rigid to maintain its shape when the pattern is removed and powder placed in the cavity, but acts like a liquid under pressure, transmitting pressure equally over the powder, resulting in high densities and dimensional control. (H14g)

99-H.* The Continuous Production of Strip by the Direct Rolling Process. D. K. Worn. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 7-13.

Direct rolling process for metal powders is currently uneconomical to compete with conventional methods for common alloys, but useful in specialized applications, involving nuclear components, or alloys too brittle for ordinary rolling. 17 ref. (H14j; 4-53)

100-H.* Consolidation of Metal Powders by Hot Working Within Sheaths. J. Williams. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 14-23.

Hot consolidation of metal powders within metal sheaths makes available a number of methods for the production of a wider variety of shapes and sizes than is possible with the normal powder metallurgi-

cal techniques. Chemically reactive metal powders can be densified without the need for special atmospheres. (H14h, F21g)

101-H.* Developments in Vacuum Sintering Furnaces. M. Donovan. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 24-32.

Vacuum equipment, heating system, and thermal insulators; induction, radiation and direct heating, use of radiation screens and other techniques. (H15q, 1-73, 1-52)

102-H.* Conditions for Effective Vacuum Sintering and Their Realization in Practice. Ctto Winkler. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 33-40.

Two types of adsorption, the desorption process, evaporation, and vacuum sintering practice. (H15q, 1-73)

103-H.* The Pressureless Sintering of Loose Beryllium Powder. T. R. Barrett, G. C. Ellis and R. A. Knight. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 41-49.

New technique established on a production basis allows consolidation of loose Be powder to high densities without application of pressure. Possibility of direct fuel-element production by sintering the powder around an uranium ceramic core. (H15n; T11g; Be)

104-H.* Zone Sintering. J. Antill and M. Gardner. Paper from "Developments in the Practice of Compacting and Sintering", Iron and Steel Institute and the Institute of Metals, p. 50-63.

Method of firing developed called "zone sintering" simplifies methods for making dense tubes and rods from powders. The technique is analogous to zone melting and consists of steadily passing a furnace at the sintering temperature over the "green ware". The method has been applied to thorium, uranium and "Hylumina" (an alumina-base refractory). (H15n; Th, U)

105-H.* (Rumanian.) **Effect of Sintering Degree on the Properties of the Double Ferrites of Nickel.** Elena Labusca and Gheorghe Stanku. *Studii si Cercetari de Metalurgie,* v. 2, no. 4, 1957, p. 483-490.

Increase of maximum sintering temperature leads to increase of density and magnetic permeability and decrease in electrical resistivity. For a certain composition of the ferrite it is thus possible to obtain sintered materials with different properties as a function of the degree of sintering. 7 ref. (H15, P10a, P15g, P16q, 2-61; Fe, Ni, 6-72)

106-H. (Book.) **Developments in the Practice of Compacting and Sintering.** Powder Metallurgy Joint Group of the Iron and Steel Institute and the Institute of Metals, Mar. 19, 1958, Church House, London, S.W.1, England.

Papers abstracted separately. (H14, H15)

107-H. Possibility of Production of Metalloceramic (Sintered) Hard Alloys Based on Chromium, Titanium, and Tungsten Borides. I. I. Iskoldsky and L. P. Bogorodskaya. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 181-188. (Translation by Consultants Bureau, Inc.)

11 ref. (H-general; 6-70, Cr, Ti, W)

108-H.* (English.) **Obtaining Metal Powders by Electrolytic Means. Pt. 1.** Atanasiu and A. Calusaru. *Revue de Metallurgie (Bucarest),* v. 3, no. 1, 1958, p. 109-120.

The polarization curves (current density against voltage) indicating the transition from the compact to the powder form of the deposition were experimentally obtained for the separation of Cu, Au and Cd from a number of solutions and the powders examined by microphotography. For every metal there is found to exist a characteristic potential corresponding to the transition from the compact to the powder deposition of the metal. 10 ref. (H10f; Au, Cd, Cu)

109-H. (German.) **Super Strong Metallic Fibers.** *Technica,* Jan. 31, 1958, p. 103.

(H17)

110-H. (German.) **Sheet Metal From Metal Powder.** Karl Wassmann. *VDI-Zeitschrift,* v. 100, Jan. 1, 1958, p. 22-23.

Production of sheet metal from Cu scraps reduced to powder. (H-general; Cu, 4-53)

111-H. (Japanese.) **Selection of Metals for Cermet Bodies of Alumina.** R. Kiyoura and T. Sato. *Ceramic Association of Japan, Journal,* v. 66, Mar. 1958, p. 49-59.

Selection of metals and fabrication of the cermet. Two factors considered in raising the strength of the product are sintering and texture. (H15, 6-70)

112-H.* Slip Casting of Metal, Ceramics, and Cermets. P. E. Rempes, B. C. Weber and M. A. Schwartz. *American Ceramic Society Bulletin*, v. 37, July 1958, p. 334-339.

Principles and problems in slip casting nonplastic powders. Techniques for slip casting a variety of materials, including metals, carbons, cermets, oxides, carbides, borides, fluorides and silicides. New "film technique" overcomes mold release difficulties. 18 ref. (H14)

113-H. Production and Use of Hydrogen and Dissociated Ammonia Atmospheres for Sintering of Powdered Metals. M. Roberts Ogle. *Industrial Heating*, v. 25, July 1958, p. 1356-1364.

Production of hydrogen and ammonia-base atmospheres and their role in the sintering of powder metals. (H15q)

114-H. Production of High Quality Steel Parts by Powder Metallurgy. Robert Talmage. *Society of Automotive Engineers*, Preprint 36 B, Mar-Apr. 1958, 14 p.

(H-general; ST)

115-H. Effect of Boron on Liquid-Phase Formation in Sintered Steel, Especially 18 Cr-8Ni Types. Friederich Benesovsky. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 149-152. (Iron and Steel Institute Translation no. 912.)

Previously abstracted from original. See item 53-H, 1958. (H15, Q-general, R2q, 2-60; SS, AY, *B*)

116-H. Production and Properties of Sintered Stainless Steel. Friederich Eisenkolb. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 141-148. (Iron and Steel Institute Translation no. 913.)

Previously abstracted from original. See item 52-H, 1958. (H10, H14, H15, Q-general; ST)

117-H. (German.) **Purification Hardening of Magnetic Sintered Alloys of the Ternary System Al-Ni-Fe and Their Modification by Cu Addition.** G. Ritzow and W. Ebert. *Deutsche Elektrotechnik*, Dec. 1957, p. 527-528.

(H16, P16, J27; Al, Ni, Fe, *Cu*, SGA-n)

118-H. Powder Metallurgy Comes of Age. Robert Talmage. *SAE Journal*, v. 66, July 1958, p. 44-47.

Procedures and advantages of powder metallurgy techniques. (H-general)

119-H.* Powder Metallurgy of Uranium and Thorium. Alan Blainey. *Metal Progress*, v. 74, Aug. 1958, p. 79-84.

Powders derived from alternative production methods vary greatly in size and shape, thus affecting "compactibility" either hot or cold. Surface oxide or compounds may prevent atomic diffusion across particle boundaries during sintering and result in weak or brittle parts. Cermets made from oxide or carbide particles have been used extensively in test reactors and components. (H-general, T11, 17-57; U, Th)

120-H.* Getting More From Metal Powders. *Metal Progress*, v. 74, July 1958, p. 101-104.

Powder metallurgy holders for carbide tools look promising; metal powders solve barrel finishing problems; slip casting expands potential for large, complicated parts from powders. These were among the new developments reported at the annual meeting of the Metal Powder Association. (H-general)

121-H. (Russian.) **Method for Determination of the Dimensions of Particles of Aluminum Powder.** I. N. Varlamova and B. P. Golubev. *Zavodskaya Laboratoriya*, no. 1, 1956, p. 80-82.

Rapid determination using a single 0.1-g. sample of the powder, by measuring average thickness of particles on the basis of the surface area occupied by the sample when it is distributed in a continuous single layer on water, and average transverse dimension of the particles under the microscope. (H11j; Al)

122-H.* (French.) Powder Metallurgy. General Development and Future Possibilities in the Field of Refractory Machine Parts and Cermets. R. Kieffer and R. Meyer. *Chimie et Industrie*, v. 79, May 1958, p. 589-599.

Properties and uses of cermets composed of oxides and metals, carbides and metals, borides and metals, nitrides and metals, sulphides and cermets with intermetallic phase. Techniques employed in manufacture of cermets; some metallurgical considerations. 123 ref. (Conclusion.) (H-general, 6-70)

123-H.* (French.) **Influence of Double Compaction on the Kinetics of Sintering of Agglomerates of Carbonyl Iron.** Georges Cizeron. *Comptes Rendus*, v. 246, May 28, 1958, p. 3060-3063.

Role of grain boundaries in elimination of pores from a sinter is illustrated by technique of double compaction and double sintering. Fragmentation of a structure which has undergone grain growth by annealing in the gamma phase causes elimination of pores and re-acceleration of speed of densification when material is resintered in alpha phase. (H15; Fe)

124-H. Furnace Sintering of Metals and Ceramics. Pt. 1. R. L. Harper. *Industrial Heating*, v. 25, Aug. 1958, p. 1530-1532, 1534, 1536, 1538.

Types of furnaces used and processes involved in making parts by sintering compacted powders of metals and ceramics (individually or combined), and metallizing of certain ceramic parts.
(H15, W26e; 6-68, NM-f)

125-H.* A Preliminary Study of the Production and Properties of Beryllium Sheet. N. A. Hill. *United Kingdom Atomic Energy Authority, AERE M/M 193*, 1958, 15 p.

Room-temperature tensile tests on beryllium sheet rolled from hot extruded, hot forged and cold compacted electrolytic powder show that maximum elongation in the plane of the sheet was obtained from cross-rolled hot forged powder. Cold bend tests were able to distinguish between unidirectionally rolled and cross-rolled sheet. 10 ref. (H14, Q5; Be, 4-53)

126-H. Fundamentals of Sintering. Pt. 2. A. L. Pranatis, L. S. Castelman and L. Seigle. *U. S. Atomic Energy Commission SEP-247*, 1958, 32 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Rates of spheroidization and densification of Au and Ni wire compacts were measured as a function of time, temperature and wire size. The necks joining the sintered particles were found to grow proportionally to the one-fifth root of time. The value of the coefficient of self-diffusion calculated from the sintering rate is of the same order of magnitude as that obtained by ordinary tracer techniques but with a somewhat higher activation energy. (H15)

127-H.* (Russian.) **Efficient Method for Production of Hard Alloy Drawing Blocks for Tubemaking.** G. S. Maksimovich. *Stal'*, v. 18, July 1958, p. 629-633.

Production of heavy-duty drawing blocks by means of hot pressing a compact into a steel race followed by mechanized grinding and finishing has considerably increased speed of tube drawing and resulted in great savings in drawing tools, as result of greater durability of drawing blocks. 4 ref.
(H14h, F26r, 1-52)

128-H.* (Book.) **Tooling for Metal Powder Parts.** George H. De Groat. 242 p. 1958. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. $7.50.

Advantages and economics in comparison to other production processes. Considerations of size, geometry, density requirements, required physical properties and surface finish in the design of structural metal powder parts; production properties and utilization of metal powders; powder preparation and conditioning. Comparison of briquetting pressed types, compacting practice. Data on relation of density to briquetting pressure, depth of fill, particle size and properties. Calculations involved in determining materials and design of punches, core pins, rods and dies. Die designs for specific parts; sintering methods, sintering atmosphere, furnace types. Sintering times and temperatures for various powders. Relation of sintering temperature and time to mechanical properties, density, shrinkage and swelling. Coining, sizing, machining, cleaning, tumbling, impregnating, infiltrating, electroplating, resintering and heat treating operations. 115 ref. (H-general, W26)

129-H. (Russian.) **Study of Certain Laws of Dispersion Hardening of Metal-Ceramic Alloys of Iron-Copper-Carbon.** G. I. Aksenov and V. K. Sorokin. *Poroshkovaya Metallurgiya, Yaroslavl'*, 1956, p. 71-77.

A greater increase in hardness has been observed in Fe-Cu-C metal-ceramic alloys than in copper steel compacts, and more time is required to reach maximum hardness. As the porosity of the specimens increases, the growth in hardness slows down, and the maximum value of hardness increment increases. Increasing Cu content reduces rate of

strengthening, a fact most noticeable at high temperature. Additional pressing of the sintered specimens causes a rapid increase in hardness during the first hours of soaking.
(H15, H16; Fe, Cu, C, 6-70)

130-H. (Russian.) **Strength of Metal-Ceramic Hard Alloys of Tungsten Carbide and Cobalt.** P. S. Kreymer. *Poroshkovaya Metallurgiya, Yaroslavl',* 1956, p. 115-126.

Optimum combination of wear endurance and strength in WC-Co alloys can be obtained by crumbling the grain with a relatively increased content of Co, or increasing the grain (to 3 to 4 microns) with a relatively reduced content of Co. The energies of the second method are proved. (H-general, Q27a, Q9n; Co, W, C, 6-70)

131-H. Cermet Preparation by Reactions in the Iron-Aluminum-Oxygen System. A. Siede and A. G. Metcalfe. Illinois Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131820, Oct. 1957, 42 p. $1.25.

Investigation to determine if better bonding and finer distribution of aluminum oxide in a metallic matrix could be achieved by method described, and whether the improved structure would have superior properties. Reactive sintering process studied by metallography, thermal analysis and mechanical testing. Excellent bonding between alloy matrix and oxide was found after reactive sintering, but the density was low.
(H15; Al, 6-70)

132-H.* (German.) **Influence of Heating Atmosphere on Oxidation of Zinc Powder.** G. Ogiermann and H. Weik. *Metalloberfläche,* v. 12, July 1958, p. 199-201.

Gravimetric experiments on oxidation indicate influence of heating atmosphere and grain size. Heating in air produces greater oxidation than in nitrogen. Oxidation was greatest for fine-grained powders. An unexpectedly large oxidation inhibiting effect results from the alligatoring of the oxide powder on expansion. 6 ref. (H15q, R1h; Zn)

133-H. (Russian.) **Investigation of the Sintering Process of Certain Metal Powders.** V. V. Saklinskiy. *Poroshkovaya Metallurgiya, Yaroslavl',* 1956, p. 21-51.

During sintering a contact is formed and made closer between particles of the powders as a result of diffusion processes, caused by the temperature mobility of the atoms. Surface diffusion predominates during the initial stage, while volume diffusion predominates in the final stage. Formation of the contact is attributed to forces causing plastic diffusion of the powder particles, and to the action of surface tension that results from liquidation of defects of the crystalline lattice. (H15, N1)

134-H.* (Japanese.) **Alumina Base Cermets. Pt. 2. Effects of Additives on the Adhesion Between Alumina and Iron.** H. Matsumoto, S. Yamauchi and G. Nishiyama. *Nagoya Industrial Experimental Station, Report,* v. 7, July 1958, p. 543-552.

To improve the adhesion between Al_2O_3 and Fe, effects of additives (i.e., MgO, CaO, MnO_2, TiO_3, Al_2O_3, TiO_2, SiO_2 and Cr_2O_3) are studied. Base mixture is 33.5% Al_2O_3 and 66.5% Fe by weight. In the sintering process sweating is observed. Contact angle, bending and compressive strengths at room temperature and shrinkage of the specimens are measured. Contact angle between Al_2O_3 and Fe in A gas flow is 146° C. To make this angle smaller MgO, MgO_2, SiO_2 and TiO_2 additives are useful. If CaO and Si are mixed in the same time, almost no sweating is observed.
(H12n; 6-70)

135-H. Study of the Possibility of Reinforcing High-Temperature Alloys by Addition of Refractory Powders. John D. Burney. Metallurgical Research Laboratory. *U. S. Office of Technical Services,* PB 131768, Feb. 1958, 49 p. $1.25.

Attempt to reinforce 80-20 Ni-Cr alloy by addition of such refractory oxides as TiO_2 and Al_2O_3. Several powder metallurgical fabrication techniques were investigated such as pressing and sintering, pressing and sintering followed by various working procedures, internal oxidation and liquid phase sintering.
(H-general; SGA-h)

136-H.* **Electrolytic Production of Straight and Alloyed Metal Powders.** I. Ljungberg. *Iron and Steel Institute, Journal,* v. 189, Aug. 1958, p. 303-306.

Electrolytic production of Fe, Ni and ferro-alloy powders used in Sweden over the last ten years. Advantages of using indirect method where brittle product is deposited on cathode and later ground. Suitable electrolyte solution and anode materials. Physical properties of metal powders and properties of sintered alloy steel produced from powders. 13 ref. (H10b; Fe, Ni)

137-H.* Powder Metallurgy of Refractory Metals. Alan Blainey. *Metal Progress,* v. 74, Sept. 1958, p. 95-96, 184, 186, 188, 190.

Hydrostatic compaction, extrusion of canned powders and compression within deformable frames are interesting techniques utilized for cladding fuel elements with pure refractory metals and making special shapes for atomic power reactors. (H-general, T11g; Zr, Cb, V, Be, Mg)

138-H.* (German.) Sintered Shapes; Production and Use. A. Hohmann. *Giesserei Praxis,* no. 15, Aug. 10, 1958, p. 294-295.

Raw materials for sintered shapes are iron, bronze and brass. Powders made by mechanical reduction, by pulverization or electrolytically. Pressing and sintering. Outstanding characteristics are wear resistance and density. Disadvantages are high production costs, expensive tools, high pressing and heating costs, consumption of "atmospheres" used in heating. Sintered parts are used in sewing machine, office machine and automobile industry. (H-general)

139-H. Routine Apparatus for Determining the Surface Area of Metal Powders. P. Hersch. *Institute of Metals, Journal,* v. 86, Aug. 1958, p. 509-511.

Simplified version of the low-temperature, nitrogen-adsorption technique for determining specific surface area of metal powders. Modified method involves determination of one point only of the adsorption isotherm; the dead space is estimated without the use of helium, and the amount of ancillary equipment required is much reduced. 5 ref. (H11j, 1-53)

140-H. Slip Casting. Its Field Broadens. L. M. Schifferli, Jr. *Product Engineering (Design Edition),* v. 29, Oct. 13, 1958, p. 84-85.

Method able to produce intricate, larger parts; adaptable to stainless steel, titanium. (H14; SS, Ti)

141-H.* (German.) Sintering of Beryllium Powder Without Pressure. T. R. Barrett, G. C. Ellis and R. A. Knight. *Planseeberichte für Pulvermetallurgie,* v. 6, Aug. 1958, p. 39-47.

Electrolytic Be is refined by vacuum melting; chips are produced and powdered in ball mill. Graphite molds are filled and jolted, followed by sintering in a vacuum induction furnace at 1200-1220° C. for 6 hr. The metal obtained is machinable. (H10e, H15; Be)

142-H. Effect of Carbon on the Quality of Sintered Carbides of the W-C-Co Type. M. Petrdlik and V. Dufek. *Hutnické Listy,* v. 10, no. 9, 1955. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB152.)

(H-general, Q-general; W, 6-69)

143-H.* Slip Casting of Metal Powders. Henry H. Hausner. *Powder Metallurgy Bulletin,* v. 8, June 1958, p. 53-67.

Selecting, weighing, mixing, stirring, degassing, pouring and molding of slip mixture. Casting is then trimmed, dried and sintered. Compares properties of slip and compact sintered powered metals. Chemical analysis, particle size distribution and apparent density of Type 316 stainless steel powder; relationship between viscosity and pH value for slip casting. (H10h; SS)

144-H.* Continuous Production of Strip From Metal Powder by the Direct Rolling Process. D. K. Worn. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 615-619.

Broad capabilities and limitations of the process considered from technical and economic points of view. Recent development makes this process competitive with conventional methods for production of Ni and Cu strips, and in specialized fields where materials must be produced by powder metallurgy. 17 ref. (H14j; Ni, Cu, 4-53)

145-H. (Russian.) Effect of Nonmetallic Additions on the Strength of Platinum at High Temperatures. I. F. Belyaev. *Tsvetnye Metally,* no. 6, 1957, p. 57-61.

Addition of metal oxides to Pt powder increases its strength at 1200° C. by several times without reducing ductility and corrosion resistance. The high heat resistance of powder with metal oxide additions is explained by the presence

of disperse oxide particles disposed along the grain boundaries and inside the grains, and also by the structure, which possesses a smaller grain size and a fine mosaic structure. (H12, Q27a, 2-62; Pt, AD-q40)

146-H.* Vacuum Reactions of Niobium During Sintering. William D. Klopp, Chester T. Sims and Robert I. Jaffee. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 106-120.

Purification of powder-metallurgy Cb bars by removal of oxygen, nitrogen and carbon during vacuum sintering at 2000 and 2150° C. was investigated. Mixtures of columbium oxide and columbium carbide were analyzed after sintering at 1500 to 2150° C. The thermal stabilities of commercial purity columbium oxide, columbium nitride and columbium carbide investigated by heating in vacuum up to 2150° C. Mechanisms for removal of oxygen, nitrogen and carbon during high-temperature vacuum sintering. 19 ref. (H15, 1-73; Cb)

147-H. Slip Casting Cermets. *Metal Industry,* v. 93, Sept. 26, 1958, p. 252.

(H14; 6-70)

148-H. Sintering of Metal Powder Mixtures, System Copper-Nickel. Similarly Shaped Powder Particles. Y. E. Geguzin. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 406-417. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB4.)

Previously abstracted from original. See item 132-H, 1956. (H15; Cu, Ni)

149-H. Aluminum Powder Metallurgy. F. V. Lenel, A. B. Backensto and M. V. Rose. Rensselaer Polytechnic Institute. *U. S. Office of Technical Services,* PB 121136, June 1955, 85 p. $2.25.

Procedures used at Rensselaer Polytechnic Institute in producing Al powder extrusions from flake pigment powders and from atomized powders. Powder properties and mechanical properties of the extrusions were tested. Yield strength at room temperature and at 400° C. increased directly with the square root of the reciprocal of the average flake thickness; weight per cent of oxide was not as important as the flake thickness in strengthening the extrusions. (H14k, Q-general; Al, 4-58)

150-H. Investigation of Molybdenum and Molybdenum-Base Alloys Made by Powder Metallurgy Techniques. W. L. Bruckart, C. M. Craighead and R. I. Jaffee. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 127913, Jan. 1955, 172 p. (Available at Library of Congress, Washington, D. C.—Microfilm $8.10; Photostats $27.30.)

Hydrogen sintering and vacuum sintering studied for the following addition elements: Al, B, Be, C, Cb, Co, Cr, Fe, In, Mn, Ni, P, S, Si Sn, Ta, Th, Ti, V, W and Zr. Evaluation of alloys made with these elements included room-temperature strength, hardness, bend ductility, hot hardness, creep characteristics and resistance to recrystallization. The following oxides were studied as additions to Mo: Al_2O_3, BaO, CaO, CeO_2, Cr_2O_3, MgO, SiO, SrO, ThO_2 and ZrO_2. (H15, 2-60, Q-general; Mo)

151-H.* Porous and Infiltrated Metal. J. E. Elliott. *Birmingham Metallurgical Society Journal,* v. 38, Sept. 1958, p. 105-128.

Selection of powders, mixing, compacting, press tools, sintering, sizing, impregnation of Cu-Sn and Cu-Fe products. (H-general; Fe, Cu, Sn)

152-H.* (German.) **Grain Growth Retarded by Trace Elements in Carbonyl Sintered Iron.** Gunther Weise and Friedrich Erdmann-Jesnitzer. *Bergakademie,* v. 10, May-June 1958, p. 316-321.

Four groups of samples tested: Fe + 0.02 to 0.08% C, Fe + 0 to 0.1% N, Fe + 0.05 to 0.3% P, Fe + 0.05 to 0.2% Cu. Grain growth retarded in proportion to the amount of alloying element. This was observed in vacuum sintering but occurred in hydrogen sintering only when P was the alloying element. 10 ref. (H15q, N3; Fe)

153-H.* (Russian.) **Compacting Ternary Mixtures of Metallic Powders.** B. Ya. Pines and A. F. Sirenko. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 261-267.

Investigation of systems Cu-Fe, Ni-Fe and Cu-Ni showed that objects made of ternary mixtures of metal powder, subject to compacting, have a tetragonal relationship (as to the degree of shrinkage and endurance limit) to the degree of concentration. Previous studies and conclusions as to shrinkage and endurance limit of binary alloys are fully applicable to ternary alloys. 4 ref. (H14, P10d, Q7; Cu, Fe, Ni)

154-H. Continuous Sintering of Quality Powdered Metal Parts in Mechanized Furnace. *Industrial Heating,* v. 25, Oct. 1958, p. 1964-1966, 1968.

(H15; 1-61)

155-H. Exothermic and Purified Exothermic Atmospheres for Sintering Powder Metal Parts. H. M. Webber. *Industrial Heating,* v. 25, Oct. 1958, p. 2000-2002, 2004, 2006, 2008, 2012.

(H15q)

156-H. Powder Metallurgy in the USSR. Claus G. Goetzel. *Journal of Metals,* v. 10, Mar. 1958, p. 180-181.

Powder metallurgy of Ti, Be, intermetallics and cermets; direct rolling of stainless steel powder. (H-general)

157-H. Slip Casting. L. M. Schifferli, Jr. *Journal of Metals,* v. 10, Aug. 1958, p. 517-521.

Nature of the process, advantages, comparison with other fabricating methods. Metal-ceramic combinations are typical of materials slip cast. 5 ref. (H-general; Cr, Mo, W, *Ti, Al,* NM-a34)

158-H. Roll-Compacting Produces Pure Nickel Strip. J. A. Lund. *Journal of Metals,* v. 10, Nov. 1958, p. 731-734.

Continuous roll-compacting of hydrogen-precipitated Ni powder, followed by suitable sintering and cold rolling operations. Mechanical properties are at least comparable to those of cast and wrought Ni. (H14; Ni, 4-53)

159-H. Rate of Infiltration of Metals. K. A. Semlak and F. N. Rhines. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 325-331.

Rate of capillary rise of liquid Cu, Pb, Ag in porous metal of Fe, FeCu (8%) alloy and Cu. 10 ref. (H16e, P13h; Fe, Fe-b, *Cu*)

SECTION J

HEAT TREATMENT

1-J. Heat Treatment of Mild Steel in Raw Town-Gas and Ammonia Atmospheres. A. H. Howes and E. Mitchell. *Iron and Steel Institute, Journal,* v. 187, Nov. 1957, p. 177-190.

Effects of temperature in the 800-900° C. range and of ammonia content up to 10% on surface layers of mild steel heated in raw town-gas. Hardenability of carbon-rich surface layers is increased with the addition of nitrogen, and surface layers of adequate hardenability which are martensitic after oil quenching are produced when mild steel is heated in the 850-900° C. range in an atmosphere of low ammonia concentration. 13 ref. (J2k; CN)

2-J. Tantalum Annealing and Degassing and Hardness Effects of Dissolved Gases. Ralph H. Perkins. Los Alamos Scientific Laboratory. *U. S. Atomic Energy Commission,* LA-2136, Sept. 30, 1957, 41 p. 7 ref.

(J23, N15, Q29; Ta)

3-J. (German.) **Induction Surface Hardening of Cast Iron.** E. A. Hohmann. *Giesserei Praxis,* v. 75, Sept. 10, 1957, p. 374-375.

Basic principle; equipment and operation; samples; calculation of hardening depth; economics. 6 ref. (J2g; CI)

4-J. (German.) **Flame Hardening of Welds.** Valentin Trunschitz. *Schweisstechnik,* v. 11, July 1957, p. 80-84; v. 11, Aug. 1957, p. 93-95.

Deformation in weld structure; gas fuels; experiments in locomotive wheel flange hardening; evaluation of experiments; flame hardening of weld reconditioned locomotive wheels; equipment, economics. 6 ref. (J2h; ST, 7-51)

5-J. (Russian.) **Properties of No. 45 Steel With Boron Added.** Ya. E. Goldshtein, L. S. Lyakhovich, L. L. Pyatakova and G. M. Trusenev. *Stal',* v. 17, May 1957, p. 449-452.

Hardenability is increased with the addition of 0.002 to 0.006% boron with corresponding improvement in other properties. It is recommended for such parts as crankshafts that are heat treated by induction. (J5, Q general; AY, *B*)

6-J. Liquid Petroleum Gas (L.P.G.) for Gas Carburizing. D. A. Colwell and J. S. Anderson. *Australian Institute of Metals, Journal,* v. 2, Aug. 1957, p. 45-47.

Use of high-purity propane gas for generation of endothermic gas for carburizing furnace atmosphere. (J28g; RM-g)

7-J. Heat Treatment of Welded Joints. K. Frauenfelder. *Brown Boveri Review,* v. 44, June-July 1957, p. 290-294.

Importance to welding in general of preheating and stress-relief heat treatment; details of Brown Boveri induction heating equipment and the cable inductors available; practical hints on the process. (J1a, W27k, K9p, K9q)

8-J. Heat Treating on Production Line Minimizes Handling. Herbert Chase. *Machine and Tool Blue Book,* v. 52, Nov. 1957, p. 129-137.

Heat treating methods and automatic equipment used at Chrysler transmission plant. (J23, J28; 18-74)

9-J. Flame Surface Hardening Reduces Distortion. Joseph H. Bockrath. *Metalworking,* v. 8, Nov. 1957, p. 6-7.

Using selective surface hardening instead of the usual cyanide case hardening cut distortion 88%, permitting the use of higher strength alloy steel for textile-machine cylinders and dials. (J2h; AY)

10-J. Prepared Annealing Atmospheres. George J. Campbell. *Steel,* v. 141, Nov. 18, 1957, p. 160-175.

Tips on avoiding difficulties with atmospheres in annealing low-carbon strip. (J23, J2k; ST)

11-J. (German.) **Potentialities and Limitations of Induction Hardening. Pt. 2.** W. Barth. *Fertigungstechnik,* v. 7, July 1957, p. 304-310.

Development of equipment, especially of the middle and high-frequency type. 9 ref. (J2g, 1-52)

12-J. (German.) **Experience With Low-Alloy Case Hardening Steel.** B. Voschenilek. *Fertigungstechnik,* v. 7, July 1957, p. 311-319.

Low-alloy (Ni, Mo, Cr, Mn) steels are tested for hardenability and mechanical properties after various forms of heat treatment. Influence of the hardening temperature; TTT-diagrams; influence of the size of the workpiece and depth of carburization. 26 ref. (J28, J5; AY)

13-J. (German.) **Hardening of Alloys With Beryllium Additions.** R. Reinbach. *Draht,* v. 8, Aug. 1957, p. 313-314.

Nonferrous alloys with beryllium are important for springs. Those most frequently used are tabulated, showing composition and mechanical properties before and after hardening. 4 ref.
(J7, T7c, 17-57; EG-a38, *Be*)

14-J. (Polish.) **Problems of Decarburization of Transformer Steel Plates.** J. Groyecki. *Hutnik,* v. 24, July-Aug. 1957, p. 289-295.

Decarburization of the steel in atmosphere of CO-CO_2 and H_2-CH_2. Results of decarburization of low-carbon and silicon steels. 7 ref. (J4a; SGA-r, AY)

15-J. (Polish.) **Supplementary Heat Treatment of Transformer Steel Plate.** F. Khol. *Hutnik,* v. 24, July-Aug. 1957, p. 299-301.

Influence of the dead weight of the transformer plates upon their magnetic properties; selection of the conditions of heat treatment.
(J general, P16; SGA-r, AY)

16-J. (Russian.) **Effect of Barium Carbonate Content in Carburizer on the Quality of the Case.** A. M. Tarasov and M. R. Semenchenko. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 49-53.

Barium carbonate is an activator of carbon; effect varies with the susceptibility of different steels to carburization. (J28g)

17-J. (Russian.) **Means of Increasing the Effectiveness of Solid Carburizers.** L. K. Luksha. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 51-54.

Sodium acetate added to the usual carbonate salts in solid carburizers definitely improves their effectiveness and reduces the time required for carburizing. (J28g)

18-J. (Russian.) **Magnetic Investigation of Tempered Nitrided Iron and Steel.** V. G. Permyakov. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 15-16.

Comparison of tempering hardened steel, hardened nitrided iron and hardened nitrided steel. 5 ref.
(J29, J28k; ST)

19-J. (Russian.) **Annealing of Heat Resistant Aluminum-Iron Alloys.** P. A. Parchutik. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 37-40.

Annealing leads to the partial coagulation and spheroidization of the eutectic components. Components in the molten alloy, hardening along the eutectic structure, solidify and the further formation of $FeAl_3$ is disrupted. (J23; Al, Fe, SGA-h)

20-J. (Russian) **Use of Sylvanite With Soda in Alloy Salt Baths.** E. A. Smolnikov. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 40-42.

Sylvanite melted with deoxidized boron may be used for heating parts which are quenched in water, water solution of NaCl, or NaOH. For oil quenching 20% soda should be added to the bath.
(J2j, W28p, 1-52)

21-J. (Russian.) **Elimination of Preliminary Heat Treatment of Steel to Be Case Hardened.** I. V. Samolov. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 46-50.

Of 24 stampings, half were normalized and the rest not, but all were case-hardened in the same manner. Tests showed no substantial difference in the main mechanical properties of the two batches.
(J28, J24, Q general; ST)

22-J. Modified Martemp Cuts Warping. Edgar C. Wallace and Howard E. Crouse. *Steel,* v. 141, Dec. 2, 1957, p. 97-98.

Floor plan and procedure for heat treating intricate and expensive parts. (J26p, 18-67; ST)

23-J. (Russian.) **Application of Protective Coating to Minimize Decar-**

burization. S. Z. Yudovich. *Stal',* v. 17, Jan. 1957, p. 69-71.

Applying a solution of sodium silicate to the surface of the work will reduce decarburization in chromium steel. (J4a; AY, *Cr*)

24-J. (Russian.) **Heat Calculation of Surface Induction Heating.** A. V. Donskoi and P. V. Firsov. *Vestnik Mashinostroeniya,* v. 37, Aug. 1957, p. 65-70.

Formula for computation of the temperature difference between the heated object and the surrounding air. Formula for computation of the penetration depth of the heat wave. 3 ref. (J2g)

25-J. (Russian.) **Repair of Steam Turbine Disks Applying Relaxation Method.** A. M. Konienko. *Vestnik Mashinostroeniya,* v. 37, Aug. 1957, p. 77-79.

Disks are heated to 570° C. under small loads. Diagram of the heating device. (J1; ST)

26-J. Quenching Oil Does Make a Difference. Chris Hendra. *American Machinist,* v. 101, Oct. 21, 1957, p. 160-161.

Requirements of quenching oil used for steel and cast iron parts following furnace heat treatment. (J26, W28p, T21f; CN-g, CI)

27-J.* Effect of Copper on the Heat Treating Characteristics of Medium-Carbon Steel. R. A. Grange, V. E. Lambert and J. J. Harrington. *American Society for Metals, Transactions,* v. 51, Preprint no. 62, 1957, 25 p.

The effect of up to 1.5% Cu on hardenability, isothermal transformation, equilibrium transformation temperatures, temperature range of martensite formation, softening of martensite on tempering, and precipitation hardening was determined for a 0.45% C steel containing graded amounts of Cu. 9 ref. (J general, N8, 2-60; CN, *Cu*)

28-J.* Application of the Endothermic Atmosphere Generator and Automatic Atmosphere-Control Instruments to Australian Fuels. Norbert K. Koebel. *Australian Institute of Metals, Journal,* v. 2, Aug. 1957, p. 27-45.

Principles and chemistry of operation of endothermic generator. Application to carburizing and neutral hardening and problems in obtaining proper grades of fuel. Status, principles and applications of automatic atmosphere control instruments. (J2k, W28q, X7j, 1-72)

29-J.* Stress Relief of Mild Steel Welded Structures. S. J. Watson. *British Welding Journal,* v. 4, Sept. 1957, p. 422-423.

Tests of tensile relaxation type carried out on mild steel annealed from 500 to 650° C. to determine effect of varying annealing time and temperatures on residual stress. 5 ref. (J1a; CN, 7-51)

30-J.* Influence of Stress-Relieving on the Initiation of Brittle Fracture in Welded Plate Specimens. R. Kennedy. *British Welding Journal,* v. 4, Nov. 1957, p. 529-534.

Effect of pre and post-welding stress relief. In untreated specimens, brittle fracture occurred at low applied stress in the 10-25° C. range. Stress-relieving treatments safeguard against initiation of such failures; the more effective the stress relief the greater the safety. 4 ref. (J1a, Q26s, K9p, K9q)

31-J.* Heat Treatment of Silicon Using Zone Heating Techniques. H. C. Theuerer, J. M. Whelan, H. E. Bridgers and E. Buehler. *Electrochemical Society, Journal,* v. 104, Dec. 1957, p. 721-723.

Changes in Si with solid-state heat treatment have been obtained with the aid of the floating zone apparatus normally used to refine Si. With this system, a liquid or solid hot zone may be caused to traverse the rod while the rest of the apparatus is kept relatively cool. Contaminants left on the Si surface even after careful etching and washing procedures are a controlling factor in the observed heat treating effects. 3 ref. (J general, C28k; Si)

32-J.* Heat Treating Plain Carbon and Low-Alloy Steel. *Iron Age,* v. 180, Oct. 24, 1957, p. 207-222.

Types of heat treatment and advantages and limitations for plain carbon and low-alloy steels, cast irons, stainless steel and aluminum. Methods of procedure and equipment. (J general, CN, AY, CI, SS, Al)

33-J. How to Get More Out of Type 410 Stainless Steel. *Materials in Design Engineering,* v. 46, Nov. 1957, p. 143.

Rules to observe in heat treating. (J general; SS)

34-J.* Modern Heat Treatment Facilities. Daniel A. Tullock, Jr. *Metal Progress,* v. 72, Nov. 1957, p. 75-78.

Heat treating equipment for hardening and coloring high-strength studs and bolts without damage to threads is installed in new building, a model of cleanliness, ventilation, light and elbow-room in the basement.
(J26n, J29, W27g, W12r, 1-52; ST)

35-J. Heat Treating the Aluminum Alloys. G. W. Birdsall. *Metal Treating,* v. 8, Sept-Oct. 1957, p. 2-5, 56.

Basic principles of metal solidification, importance of solid solution, solid diffusion, precipitation in the heat treatment of Al alloys.
(J general; Al)

36-J.* Precipitation Hardening Stainless Steels. *Metal Treatment and Drop Forging,* v. 24, Nov. 1957, p. 437-438.

New steel, F.V. 520, developed by Firth-Vickers, is capable of withstanding high frictional temperature aircraft and missile applications and possesses high tensile and fatigue resistance, 500° C. ceiling temperature for service and stainless properties equivalent to 18-8 steels.
(J27, Q general; SS)

37-J. Manufacture of Steel Springs. *Metal Treatment and Drop Forging,* v. 24, Nov. 1957, p. 465-467.

Automatic methods of heat treatment at Alco Products Inc., Chicago Heights. (J general, T7c; CN)

38-J. Vacuum Heat Treating Hairsprings. Tom Raedy. *Steel,* v. 141, Oct. 21, 1957, p. 94-97.

Hairsprings of Ni-Span "C", a Ni-Cr-Fe-Ti alloy and other metals heat treated in vacuum to prevent surface oxidation.
(J2k, 1-73, T7c; Ni, Cr, Fe, Ti)

39-J. (Dutch.) **Cost Saving by Isothermal Soft Annealing.** C. H. Luiten. *Metalen,* v. 5, Oct. 15, 1957, p. 391-394.

In the initial shaping of knives and scissors by warm forging, the steel is usually heated beyond the hardening temperature. In normal cooling in air hardness increases. Hence a soft annealing treatment is necessary after forging to improve machinability. The separate annealing treatment can be successfully replaced by isothermal annealing, in which the cooling from forging temperature at 700° C. is interrupted for some time. (J23s; ST)

40-J. (German.) **Hardened Copper-Titanium-Aluminum Alloy.** W. Gruhl and H. Cordier. *Metall,* v. 11, Nov. 1957, p. 928-933. (CMA)

By addition of titanium and appropriate heat treatment, copper can be appreciably hardened. The procedure has never been industrially applied. Satisfactory results can be had by adding Al together with Ti. The alloy was heated at 800° C. for 5 hr., quenched in water or air for a few minutes, and hardened by a prolonged annealing at 350-500° C. 11 ref. (J23, J26; Cu, *Ti, Al*)

41-J.* (German.) **Heat Treatment of Toolsteels.** Josef Frehser and Otmar Lowitzer. *Stahl und Eisen,* v. 77, Sept. 1957, p. 1221-1233.

The mechanism of the change in dimensions during heat treatment of nonhardenable steels and toolsteels with different quenching temperatures. Effect of thermal and transformation stresses in behavior of steels and in dimensions of tools during heat treatment. 13 ref.
(J general, P10d; TS)

42-J. Influence of Precipitation Hardening Heat Treatment on the Hardness of Several Uranium-Molybdenum Alloys. T. I. Jones, et al. Los Alamos Scientific Laboratory. *U. S. Atomic Energy Commission,* LA-1715, 83 p. (CMA)

4 ref. (J27a, Q29n; U, Mo)

43-J. (German.) **Induction Heating of Ferromagnetic Materials.** J. Minsieux. *Deutsche Elektrotechnik,* v. 11, Aug. 1957, p. 381-383.

Theory, application and equipment for surface hardening of steel.
(J2g; ST)

44-J. (German.) **Hardening.** Walter Stuhlmann. *VDI Zeitschrift,* v. 99, Aug. 1957, p. 1202-1205.

Literature review. 27 ref.
(J general)

45-J.* Nitriding of Large Forgings. C. W. Johnson. *Metal Progress,* v. 72, Dec. 1957, p. 99-101.

Large crankshafts for diesel engines, forged and completely machined, are nitrided by National Forge & Ordnance Co. As has been demonstrated for aircraft engine crankshafts, the nitrided surface (being in compression) notably increases fatigue strength and endurance, as well as wear.
(J28k; AY, 4-1)

46-J.* Annealing of Steel Sheet. G. W. Form and E. B. Evans. *Metal Progress,* v. 72, Dec. 1957, p. 111-112, 142.

While batch annealing takes hours, the product is softer and more desirable for deep drawing than that from the rapid continuous annealing. "Snakes" (a ripply surface) are suspected to be subsurface oxides, and they form even when the standard D-X atmosphere is maintained during annealing. Directional orientation of microstructure and strain aging characteristics are still matters which require correction in tonnage mill products. (J23; Cn, 4-3)

47-J.* **How to Make Invar Stay Put.** Warren S. Eberly. *Product Engineering,* v. 28, Dec. 9, 1957, p. 80-81.

Special heat treatments to stabilize dimensions and themal coefficients. This coefficient value reaches a minimum at 36% Ni and increases rapidly with small changes in Ni content. Nickel must be held between 35.5 and 36% to assure consistent behavior in service.
(J23q, P10d, P11, 2-60; Ni)

48-J. **Effect of Heat Treatment on the Structure of A2 Cold Work Die Steel. Pt. 41.** R. F. Harvey. *Steel Processing and Conversion,* v. 43, Dec. 1957, p. 696-697.

(J22, J29; TS)

49-J. **Modern Quenching Techniques.** O. E. Cullen. *Steel Processing and Conversion,* v. 43, Dec. 1957, p. 700-701, 704, 708-709.

(J26; ST)

50-J. (English.) **Effect of Isothermal Magnetic Annealing on the Magnetic Properties of Nickel-Cobalt Alloys at Room Temperature.** Hakaru Masumoto, Hideo Saito and Minoru Takahashi. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 374-394.

3 ref. (J23s, P16b; Ni, Co)

51-J. (German.) **End Quenching Test for Flame-Hardening Steel Castings.** Hans Wilhelm Grönegress. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1619-1623.

Determination of hardness depth; effects of preheating, quenching temperature and type of heating. 6 ref. (J5, J2h; ST, 5-60)

52-J. (Russian.) **Maximum Temperature Interval Between Forging and Heat Treatment of Large Shafts Made of Al-Mn Bronze No. 9-2.** N. N. Popova and N. A. Kravchenko. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 28-33.

Macroscopic examination of various ingots for pump shafts disclosed that forgings may be made free of defects as long as the work is kept within the required temperature range. Maximum heat interval was determined to be 900-800° C. 4 ref. (J general, 4-51; *Al, Mn,* Cu)

53-J. (Russian.) **Rapid Cyanidation by Heating With High-Frequency Current.** A. S. Barshcheva and V. S. Gnuchev. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 48-50.

The soluble salt process can be readily mechanized so that hundreds of parts may be treated in 1 hr. Thickness of cyanided layer varies between 0.02 and 0.06 mm. and its hardness may be as high as 60 R_c. (J28j, 1-69; ST)

54-J.* (Russian.) **Elimination of Local Brittleness in Iron Plate.** M. V. Pridantsev and E. V. Smirnov. *Stal',* v. 17, Aug. 1957, p. 736-740.

To eliminate local brittleness of iron plate caused by oxidation during annealing, it is essential to anneal the plate at 900-950° C. in an inert, dry atmosphere such as hydrogen or dissociated ammonia. 3 ref. (J23a, Q26; Fe, SGA-n)

55-J.* (Russian.) **Experimental Application of Protective Atmosphere.** S. A. Kulikovskii, A. N. Kalyuzhnii, M. M. Bart and B. Ya. Zeilikovich. *Stal',* v. 17, Aug. 1957, p. 740-744.

A protective atmosphere of producer gas containing 7-9% CO in bell-type furnace for bright annealing eliminates or considerably reduces subsequent pickling time of iron sheets. (J23a; Fe, SGA-n)

56-J. **Induction Heating and Its Applications in the Metal Working Industry.** Gerhard Seulen. *AEG Progress,* v. 3, 1957, p. 93-99.

Induction heating as an aid to automation of production in foundries and forges; advantages in hot forming, surface hardening, soldering and annealing operations.
(J2g, F21b, 1-69, K7e, 1-52)

57-J. **Application of Furnace Atmospheres. Pt. 1.** C. E. Peck. *Industrial Heating,* v. 26, Nov. 1957, p. 2268-2280.

(J2k; ST)

58-J. **Advantages of Fast Quenching and Common Misconceptions.** Frank M. Aldrich. *Industrial Heating,* v. 11, Nov. 1957, p. 2301-2304.

(J26p; ST)

59-J. **Heat Treatment of Transmission Gears.** *Machinery,* v. 91, Oct. 18, 1957, p. 920-922.

Note on arrangement and operations of gas carburizing, salt-bath carburizing and induction hardening line for processing 1000 lb. of commercial vehicle transmission gears every 7 hr.
(J28g, J2g, J2j, T21c; ST)

60-J.* Vocabulary of Heat Treatment. G. R. Morton. *Metal Treatment and Drop Forging,* v. 24, Dec. 1957, p. 481-490.

Fundamentals of the heat treatment of steel and the precise meaning of the various terms. Effect of structure on mechanical properties. 8 ref.
(J general, Q general, 3-71, 11-67; ST)

61-J. Single Stack Annealing Gets the Nod. Howard E. Miller. *Steel,* v. 141, Nov. 11, 1957, p. 118-126.

Compares results of annealing coiled cold rolled steel strip in single and multiple stack furnaces at Republic Steel.
(J23, W27, 4-53; ST)

62-J. Salt Bath Free Fall Quench Cuts Distortion. *Western Metals,* v. 15, Oct. 1957, p. 46-47.

Formed Al aircraft parts are heat treated in nitrate salt baths at 950° F. and water quenched by free fall method to minimize distortion.
(J26n, J2j; Al)

63-J. Continuous, Rapid Heat Processing Makes High Strength, Seamless Oil Tubing. *Western Metals,* v. 15, Oct. 1957, p. 57-60.

Operation and work flow on continuous line consisting of series of radiant gas-fired chambers and quenching and tempering units for heat treatment of seamless carbon steel pipe. (J26, W27g; ST, 4-60)

64-J. (German.) **Developments in Magnesium Industry.** A. Hohmann. *Giesserei Praxis,* v. 75, Nov. 10, 1957, p. 476-478.

Modern heat treatment for Mg alloys, Mg in nodular graphite cast iron. (J general, E25q; Mg, AD-p37)

65-J.* (Spanish.) **Experimental Study of Some Factors Which Affect the Quality and Depth of High-Frequency Induction Surface Hardening in Carbon Steels.** Miguel P. de Andrés Sanz. *Instituto del Hierro y del Acero,* v. 10, July-Sept. 1957, p. 320-354.

Macro and micro examination, as well as microhardness tests, of Spanish-made carbon steels after hardening, defined surface, intermediate and center layers and basic metallurgical characteristics of these layers. By systematic study of successive structures it was possible to determine stages of mechanism of progressive austenitizing and explain process of surface hardening. Initial structure was found to influence hardenability of specimens. Depth of layers and total modified structure were studied as function of heating times and power consumption. (J5, J2g, N8; CN)

66-J. (Russian.) **Industrial Use of Quick Induction Heating.** M. G. Lozinski. *Vestnik Maschinostroeniia,* no. 11, Nov. 1957, p. 66-75.

Method of quick chemical-thermal treatment of steel in machine building. (J2g; ST)

67-J.* Production of Ferrite in Spheroidal Graphite Cast Iron by Heat-Treatment. John Gittus. *Iron and Steel,* v. 30, Nov. 1957, p. 603-607.

Investigation of possibility of modifying the usual 2 to 8 hr. at 850 to 900° C. and 4 to 12 hr. at 690 to 720° C. annealing processes used for changing pearlitic matrix of spheroidal graphite iron castings to ferritic matrix with greater ductility and shock resistance. Effect of elimination of first stage annealing on structure of ferrite formed and effect of Si-Mn, P, Ni and Cu on structure produced by various second stage anneals. Compares rates of graphitization and the structures produced by first stage annealing in Mg-bearing and Mg-free irons containing eutectic carbides. Influence of Si, Ni, Cr, Mn and Mo content on the tendency for eutectic carbides to be produced during solidification and the facility with which they can be graphitized at 900° C. (To be concluded.) 5 ref.
(J23, N8s, 1-60; CI-r)

68-J* Hardenability of Pearlitic Malleable Iron. R. W. Heine. *Modern Castings,* v. 33, *American Foundrymen's Society, Preprint* No. 58-20, Jan. 1958, p. 48-52.

Report of AFS Pearlitic Malleable Committee presents end-quench hardenability curve data. Information is given to aid purchaser or user of castings to apply final heat treatment. 3 ref. (J5; CI-s)

69-J. (German.) **Rotary Hardening of Gears.** Frank J. Overkott. *Werkstatt und Betrieb,* v. 90, Aug. 1957, p. 501-507.

Principles of rotary hardening and important factors including steel

composition, gear form, tooth profile, tooth width, tooth number, hardening method, hardening temperature, burner design, number of burners, gas compositon and oxygen consumption in flame hardening, heating time, quenching media and method, their effects on distortion, hardness values, and microstructure of the workpiece. (J2h, T7a; ST)

70-J. (Russian.) **Tempering of Surface Hardened Parts by Induction Heating.** Yu. M. Bogatirev and S. M. Gamazkov. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 51-58.

7 ref. (J29, J2g; ST)

71-J. Treatment of Large Forgings. N. V. Fiksen. *Metallovedenie i Obrabotka Metallov,* no. 11, Nov. 1957, p. 77-80. (Henry Brutcher, Altadena, Calif., Translation no. 4095.)

Shortening of time needed for heat treatment through modernization of furnaces increased productivity by 30% and reduced fuel consumption by 10%. (J general, W27, 4-51; ST)

72-J. (Russian.) **Heat Treatment of Low-Carbon Steel.** N. V. Shmidt, Z. N. Krasilshchikov, N. T. Pavlenko and I. N. Shvach. *Stal',* v. 17, Sept. 1957, p. 833-837.

Heat treatment process by which properties can be upgraded to be equal to the properties of low-alloy steel. 6 ref.
(J general; CN-g, AY-b)

73-J.* **Dependence of Decarburization on Rate of Graphitization in Whiteheart Malleable Iron.** C. T. Moore. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 82-94.

Apparatus capable of continuously recording the weight changes of malleable irons during decarburization in a gaseous atmosphere. The rate of decarburization is decreased when graphitization of eutectic cementite occurs, although the effect is slight in balanced sulphur irons. Evidence suggests that during the later stages of annealing the solution rate of graphite is a controlling feature of the decarburization process particularly in excess sulphur irons. 5 ref. (J23, J4a, N8s; CI-s)

74-J. Applications of Furnace Atmospheres. Pt. 2. C. E. Peck. *Industrial Heating,* v. 24, Dec. 1957, p. 2486-2492.

Types of atmospheres employed in hardening treatments for ferrous metals. (To be continued.)
(J2k; ST)

75-J.* **Effect of Heat Treatment on the Hardness and Microstructures of U-Ti Alloys.** David L. Douglass and Lyle L. Marsh, Jr. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1260-1267. (CMA)

Wide variations in the hardness and microstructure of U-Ti alloys (8.5, 25.5 and 50 at. % Ti) may be effected by suitable heat treatments, especially quench-temper and isothermal transformation. Slow-cooled specimens were softer and there were no great changes with Ti content. Hardness achieved by quenching from the $\beta + \varepsilon$, $\gamma + \varepsilon$ and γ fields are compared. Shattering occurred on quenching from the γ field because of the volume changes attendant on U_2Ti. High hardness resulted when alloys were quenched from regions where U_2Ti is stable. 4 ref. (J26, Q29n, M27; U, *Ti*)

76-J.* **Tool Steels in Service. Pt. 2. Practical Aspects.** A. P. T. Taylor-Gill. *Iron and Steel,* v. 31, Jan. 1958, p. 19-24.

Methods whereby distortion and size changes can be held at a minimum. Suitable austenitizing temperatures for commonly used tool-steels are 770° C. for plain high-carbon, 820° C. for plain 0.60 C steel, 800° C. for 1% C 1% Mn-Cr-W type oil hardening steel, 1030° C. for 2% C high-carbon, high Cr and 5% Cr-Mo steels, 1050° C. for 5% Cr-Mo-W steels, and 10% W types. 9 ref. (J22; TS, 9-74)

77-J. (Japanese.) **Heat Treatment of Magnesium-Zinc-Zirconium Alloy.** Shotaro Morozumi and Tomoyuki Takeuchi. *Light Metals* (Tokyo), v. 7, Nov. 1957, p. 73-81.

8 ref. (J general, 2-60; Mg, *Zn, Zr*)

78-J.* **Controlling Carburized Case Depth.** R. L. Suffredini. *Materials in Design Engineering,* v. 47, Jan. 1958, p. 118-119.

Quality control of carburized parts can be achieved by rapid nondestructive hardness testing. Effects of the case depth and various hardening treatments on the resulting hardness values are outlined and correlation is obtained by making a superficial Rockwell determination, sectioning the sample and determining the case depth by microscopic examination. (J28g, Q29)

79-J. Quenching Oil Does Make a Difference. Chris Hendra. *Metalworking Production,* v. 101, Nov. 29, 1957, p. 2138-2139.

How properties of quenching oil relate to operations in use and kinds of work being processed. (J26n, W28p; ST)

80-J. Heat Treating. An Important Step in Punch and Die Manufacture. Joseph H. Bockrath. *Tool Engineer,* v. 39, Dec. 1957, p. 96-100.

(J general, W24n, W24p)

81-J. (French.) **Heat Treatments by High Frequency Induction.** *Machine Moderne,* v. 51, Nov. 1957, p. 38-40.

Capacity and induction heating are used to produce superficial hardening of tools and continuous quenching. Description of the process. 6 ref. (J2g; ST)

82-J. (German.) **Heat Treatment for Steel Castings.** A. Hohmann. *Giesserei-Praxis,* v. 75, Oct. 1957, p. 453-456.

Metallurgical properties, especially chemical composition, determine the proper heat treatment. (J general; ST, 5-11)

83-J. (German.) **Heat Treatment Technique for Machine Steels.** H. Schultz-Balluff. *Industrie-Anzeiger,* v. 79, Aug. 27, 1957, p. 42-47.

Best technique for hardening and case hardening steel. (J26, J28; ST)

84-J. (German.) **Contemporary Aviation Steels and Their Heat Treatment.** Heinz Kiessler. *Schweizer-Archiv,* v. 23, Sept. 1957, p. 304-310.

Properties and heat treatment of various types of steel used in the German aircraft industry. (J general, Q general, T24, 17-57; ST)

85-J. (Russian.) **Carbon Content of Steels Subjected to Carburizing.** S. S. Ermakov. *Metallovedenie i Obrabotka Metallov,* July 1957, p. 43-45.

The maximum carbon content of case hardened steel parts, which are subjected to repeated dynamic loading, should not exceed 0.20-0.23%. 4 ref. (J28, 2-60; ST)

86-J. (German.) **Induction Heating in the Processing of Tungsten.** H. Herklotz. *Fertigungstechnik,* v. 7, Sept. 1957, p. 400-402.

Economy lies in the omission of heating-up periods. Crystal structure depends upon temperature and heating time; optimum is achieved with high-frequency current at 1850° C. (J2g; W)

87-J. (German.) **Surface Treatment of Gray, Temper and Steel Castings With Medium Frequency Induction Heating.** G. Hoffmann. *Fertigungstechnik,* v. 7, Sept. 1957, p. 403-407.

(J2g; CI-n, CI-s, ST)

88-J. (German.) **Comparison Between Processes of Wire Patenting.** Erich Jaenichen, Klaus Schlegel, Franz Greis, Hans Krautmacher and Wilhelm Püngel. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1802-1817.

Effects of electric resistance patenting on properties of steel containing 0.35-0.95% carbon. Testing wires patented by electric resistance and Pb after heating in gas-fired continuous furnaces. (J25, 4-61; ST)

89-J. (Russian.) **Influence of Carbon Upon Endurance Limit of Carburized Steel.** I. D. Rybasenko. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 19-21.

1.1% of carbon in the diffusion layer of the carburized steel is the upper limit above which the endurance limit of the steel falls will be impaired. 3 ref. (J28g, Q7a; ST)

90-J. (Russian.) **Surface Hardening of Carbon Steel by Gas Carburization.** O. K. Kotov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 28-33.

3 ref. (J28g; CN)

91-J. (Russian.) **Industrial Application of Gas Cyaniding.** B. A. Stetsenko. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 43-48.

Gas cyaniding of gears. 4 ref. (J28j, T7a; ST)

92-J. (Russian.) **Prevention of Decarburization of Alloy Steel on Annealing in Protective Atmosphere.** K. V. Dneprenko and M. M. Ioffe. *Stal',* v. 17, Oct. 1957, p. 934-935.

Protective atmosphere saturated with benzol or passed through hot charcoal practically eliminates decarburization of steel on annealing. (J4a, J23, J2k; AY)

93-J. Application of Furnace Atmospheres. Pt. 1. Atmospheres for Brazing and Sintering and for Nonferrous Heat Treatments. C. E. Peck. *Industrial Heating,* v. 25, Jan. 1958, p. 56-64.

(J2k, K8, H15q, 1-52)

94-J. Heating of Steel for Working and Treatment. F. C. Bird. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 13-21.

Methods of heating, types of fuel, furnaces, combustion conditions, heat transfer, temperature control, insulation, relative efficiency and comparative cost. 8 ref. (J general, F21, 1-55, ST, RM-j, RM-k, RM-m)

95-J. Modified Martemp Cuts Warping. Edgar C. Wallace and Howard E. Crouse. *Steel,* v. 141, Dec. 2, 1957, p. 97-98.

Switching to controlled atmosphere furnace and martempering at 275° F. eliminated warping and stabilization difficulties for pump blocks made of 52100 steel or stainless steel. (J26p, J2k; ST, SS)

96-J. New Way to Measure Quenching Speed. E. A. Bender and H. J. Gilliland. *Steel,* v. 141, Dec. 30, 1957, p. 56-59.

(J26, X13, W28p; ST)

97-J.* (French.) Structural Hardening of Some Copper Alloys. J. Schoofs. *Revue Universelle des Mines,* v. 13, Dec. 1957, p. 699-707.

Theory of structural hardening; heat treat conditions and phenomena occurring during hardening of a dozen alloy combinations, including Cu-Cr and Cu-Be systems as well as lesser known ternary and quaternary systems; mechanical properties and applications of these alloys. 9 ref. (J general, N6, N9, Q general, 17-57; Cu, *Cr, Be*)

98-J. (Hungarian.) Causes of Changes in the Dimensions of Hardened Steel. Zoltan Csepiga. *Kohaszati Lapok,* v. 12, Nov. 1957, p. 465-469.

Dimensional changes during transformations induced by heating. (J general, P10d; ST)

99-J.* Automation in Heating and Quenching. Norbert K. Koebel. *Metal Progress,* v. 73, Feb. 1958, p. 72-78.

Whether the part in mass production be a knitting needle, a gear or a ship plate, automatic line-ups of heat treating equipment can deliver a steady stream of product of superior uniformity meeting strict specifications for dimension, surface, and strength. (J-general, W27, 18-74)

100-J. (German.) Hardening in the Job Shop. W. Ordinanz. *Technica,* v 6, Nov. 1957, p. 1357-1361.

(To be continued.) (J28, 18-67; ST)

101-J.* Principles and Application of Heat Treatment for Titanium Alloys. A. J. Griest and P. D. Frost. *Battelle Memorial Institute, TML Report no. 87,* Dec. 27, 1957, 132 p.

Relationships between alloy constitution, microstructure and properties obtained on heat treatment. Properties for selected commercial alloys in the heat treated condition; room-temperature and short-time elevated-temperature data; impact energy, creep, stress stability, fatigue and hardenability data; heat treating practice, including furnace characteristics, coatings for minimizing contamination and procedures for the control of distortion and flatness during heat treatment. (J-general, Q-general; Ti)

102-J. Russia Looks at Induction Hardening, Forming. K. Z. Shepelyakovskii. *American Machinist,* v. 102, no. 3, Feb. 10, 1958, p. 118-121. (From *Avtomobilnaya I Traktornaya Promishlennost.)*

Problems solved in induction heat treatment of gears. Induction heating used in forging ball bearings, stamping valves and rolling gears. (J2g, F21b, T7a; ST)

103-J.* (French.) Heat Treatment of a Cupro-Aluminum. *Journal d'Informations Techniques des Industries de la Fonderie,* no. 92, Nov-Dec. 1957, p. 11-13.

Problem of raising Brinell hardness of cupro-aluminum castings to around 240 while maintaining elongation at minimum of 10%. Dilatometric study revealed temperature of total transformation of alloy to be 980° C. On this basis, heat treatment was devised to provide required mechanical characteristics in specimens; comprises (a) heating to 700° C. and holding at this temperature for 2½ hr., followed by cold water quench, (b) tempering at 400° C. for 4 hr., followed by slow cooling. Figures are subject to revision in function of sizes of actual parts. (J26, J29; Cu, Al)

104-J.* Quenching and Quenching Media. B. F. Russell. *Australasian Engineer,* v. 50, Jan. 7, 1958, p. 70-79.

General discussion of steel quenching, transformation theory and hardenability. Oils, salt baths, marquenching, subzero cooling and air hardening. 22 ref. (J26, W28p, 1-52)

105-J. (German.) Surface Treatment of High-Speed Steel Tools. H. D. Weckener. *Werkstatt und Betrieb,* v. 91, Jan. 1958, p. 33-38.

38 ref. (J28; TS-m)

106-J.* (German.) Experiences With Flame Hardening in a Hardening Shop. R. Jonsson. *Werkstattstechnik und Maschinenbau,* v. 47, Nov. 1957, p. 610-615.

Basic aspects of planning. Choice of materials and examples of work types. Calculation of prime costs. (J2j, 17-53)

107-J.* (German.) Problem of Measurement and Control in a Hardening Department. O. Schaaber. *Werkstattstechnik und Maschinenbau,* v. 47, Nov. 1957, p. 630-635.

Measurement and control of temperature, heating and cooling speed, carbon potential, carbon transition time and gas composition during carburizing. (J28)

108-J. High Velocity Gas Stress Relieving Furnace. Edward M. Yard. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 95-100.

Furnace employs gas at 700° F. circulating at 7000 ft. per min. to stress-relieve ⅜-in. steel wire strand at the rate of 32 to 36 ft. per min. (J1a, W27g, ST, 4-61)

109-J. Some Spring Heat Treating Practices Defined. James Maker. *Metal Treating,* v. 9, Jan-Feb. 1958, p. 2-3, 36, 42, 43.

Stress relieving, hardening, tempering and finishing processes applied to springs. (J1a, J26, J29, T7c; ST, Ni, Be, Cu)

110-J.* Heat Treating in Vacuum. Horace B. Drever. *Metal Progress,* v. 73, Mar. 1958, p. 108-109.

Vacuum melting is a familiar process; vacuum heat treating is relatively new. Annealing, tempering and hardening are possible, though some precautions must be observed. Examples. (J2, 1-73)

111-J. (French.) Kinetic and Structural Phenomena Occurring During the Carburizing of a Pure Iron. Gaston Collette, Paul Gendrel and Leon Jacque. *Comptes Rendus,* v. 246, Jan. 20, 1958, p. 419-422.

(J28g; Fe-a)

112-J. (French.) Hardening and Machining at Temperatures Below Zero. R. J. Delaney. *Machine Moderne,* v. 52, Jan. 1958, p. 25-29.

Improved quality of metal aircraft parts obtained through three variations of below-zero treatment; quenching, sprinkling during machining and temperature changes from subzero to 212° F. (J26q, G17, 2-63)

113-J. (German.) Influence of Aluminum Content on Annealed Surface Structure and on Nitrided Case of 35CrA16. H. Burger. *Fertigungstechnik,* v. 7, Dec. 1957, p. 552-556.

Increasing Al content advances the decarburization and shifts the Ac_3 transformation to higher temperatures. The nitriding depth is reduced. (J28k, M27, AY, *Cr, Al*)

114-J.* (German.) Heat Treatment of Cast Iron for Increasing Wear Resistance. J. Mainke. *Fertigungstechnik,* v. 8, Jan. 1958, p. 33-36.

Hardening, tempering and annealing; their mechanism and technique. Results of experiments. (J-general, Q9n; CI)

115-J. (German.) Carburizing Steel With Liquid Hydrocarbons. Franz Michel. *Industrieblatt,* v. 57, Oct. 1957, p. HT93-HT97.

(J28g; ST)

116-J. (German.) Improvement of Quality of Tools by Proper Heat Treating. F. Haberll. *Industrieblatt,* v. 57, Oct. 1957, p. HT97-HT100.

(J-general; TS)

117-J. (German.) Salt Bath Hardening. H. Adomeit. *Industrieblatt,* v. 57, Dec. 1957, p. HT117-HT119.

(J2j)

118-J. (German.) Increase of Durability of Tools by Nitriding. R. Topp. *Industrieblatt,* v. 3, Dec. 1957, p. HT119-HT124.

(J28k; TS)

119-J. (German.) Automation in Hardening. Wilhelm Inden. *Industrieblatt,* v. 57, Oct. 1957, p. 477-479.

Electric rail conveyor system effects savings in gear hardening operation. (J2g, T7a, W12r)

120-J. (German.) Investigation of Tempering Procedure of Low Alloy Toolsteels With 1% C. H. Krainer, K. Ebner, E. Krainer and M. Storek. *Radex Rundschau,* no. 5-6, 1957, p. 803-831.

55 ref. (J29; TS)

121-J. (Russian.) Development of the Theory of Heat Treatment of Steel by Soviet Scientists. V. D. Sadovskii. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 2-14.

(J-general, N8; ST)

122-J.* (Russian.) Surface Hardening of Titanium Treated in Fluxed Borax. A. N. Minkevich and Y. N. Shul'ga. *Metallovedenie i Obrabotka Metallov.* Dec. 1957, p. 53-61.

With electrochemical protection it is possible to treat Ti in fluxed borax. Hardness of the surface was doubled or tripled. Ti is heated to 900-930° C. for 3 hr. at a current density of about 0.1 amp. per sq. cm. Longer exposure results in brittleness and undesirable mechanical characteristics. (J28; Ti, NM-a33)

123-J. (Russian.) Optimum Temperature of Hardening Cold Worked Steel No. 1X18N9T. T. N. Rafalovich. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 69-72.

6 ref. (J28, 2-61; ST)

124-J.* Furnace Atmospheres From Liquids. I. L. S. Golding. *Metallurgia,* v. 57, Jan. 1958, p. 23-25.

Carburization of iron using alcohol and alcohol-water as the source of carbon. (J28, J2k; ST)

125-J.* Steam Atmosphere Heat Treating. A New Approach to Scale-Free Heat Treating. F. L. Spangler. *Steel Processing and Conversion,* v. 44, Jan. 1958, p. 35-37.

Coating and heat treating of various plumbing and machine parts made from copper and steel alloys by means of steam atmosphere. In many cases, steam treating of brasses and bronzes eliminates pickling and the surface cleaning operations. (J2k; Cu, ST, RM-g32)

126-J. The Metallographic View. Pt. 44. Importance of Multiple Tempering of High Speed Steels. R. F. Harvey. *Steel Processing and Conversion,* v. 44, Mar. 1958, p. 150-151.

(J29, N8a, Q29n, 2-14, TS-m)

127-J. (English.) Annealing Characteristics of 24S and 61S Alloys. Rihei Kawachi. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 78-87.

(J23, N7, M27, 2-60; Al, *Mn, Cr*)

128-J.* (Czech.) Effect of Nitriding on the Internal Damping of Steel. Josef Vodsed'alek and Rudolf Stefec. *Hutnické Listy,* v. 13, Jan. 1958, p. 9-14.

Characteristic phenomena that manifest themselves during nitriding include interval tension and structural changes in the damping variations. In nitrided parts, especially in austenitic steels, it is possible to expect damping changes. Nitriding is usually accompanied by a slight decrease of damping during bending and torsion stresses, exceeded by a simultaneous increase of fatigue stress. 15 ref. (J28k, Q22; ST)

129-J. (German.) Oxidation-Free Heat Treatment in Lithium Atmosphere. F. Neuberger, etc. *Fertigungstechnik,* v. 7, Oct. 1957, p. 453-455, 471.

Lithium vapor atmospheres inhibits scale formation and decarburization through protective film formed on metal surface. Equipment and processing results of laboratory and plant experimentation. Advantages in better surface quality and reduced cleaning costs. 10 ref. (J2k; *Li*)

130-J. (German.) Automation in High-Frequency Heat Treatment. W. Lück. *Fertigungstechnik,* v. 7, Oct. 1957, p. 456-460.

Principles, construction, application and operation of equipment. (J2g, W27k, 18-74)

131-J. (German.) Heat Treatment of Steels Used in the Fabrication of Pressure Casting Dies. Karl Schönert. *Giesserei,* v. 45, Mar. 13, 1958, p. 133-139.

General behavior in the hardening process; stress-relieving annealing; hardness testing. 4 ref. (J26, J1a, W19n)

132-J. (German.) Modern Equipment for Protective Furnace Atmospheres. A. Hohmann. *Giesserei-Praxis,* v. 75, Nov. 25, 1957, p. 499-500.

Equipment and processing with city gas, natural gas and lithium vapor; desulphurization. (J2k, W27n)

133-J. (Japanese.) Annealing of an Extruded Aluminum Rod. Yoshikazu Hosoi, Mamoru Yukawa and Eiichi Sawato. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 33-38.

Preheating of the cast billet gave the extruded rod properties similar to extrusions made at higher temperature. Comparison of annealed and stretched rods. 6 ref. (J23, F21b, F24, 4-55; Al)

134-J.* Molten Metals and Alloys as Heat Treating Media for Steel Components. A. P. Garashchenko, A. P. Gulyaev and Z. S. Luneva. *Metallovedenie i Obrabotka Metallov,* Jan. 1958, p. 21-26. (Henry Brutcher, Altadena, Calif., Translation no. 4119.)

Al-Si alloy recommended as heating medium for local heat treatment of steel parts. The alloy containing 8-12% Si is suitable for tempering and the alloy containing 6-10% Si and 5-7% Fe can be used for annealing. Both alloys are equal in performance to Pb without the hazards of the latter. Means of protection of crucibles, thermocouples and treated parts as well as ways to minimize handling losses of the alloys. (J2j; ST, Al)

135-J. Establishing Heating Schedules for Steel Parts Taking Into Consideration Thickness of the Mill Scale, Depth of Decarburization and Grain Size. I. F. Golovnev. *Metallovedenie i Obrabotka Metallov,* Jan. 1958, p. 49-55. (Henry Brutcher, Altadena, Calif., Translation no. 4126.)

Graphs of heat treatment of steel components showing optimum conditions with minimum formation of surface defects due to scale, surface decarburization and grain growth. 7 ref. (J-general; ST, 9-71)

136-J.* (German.) **Influence of Gas and Salt Bath Nitriding on Properties of Structural Steels. Pt. 1.** H. Wiegand and M. Koch. *Metalloberfläche,* v. 12, Mar. 1958, p. 69-74.

Mechanism and technique of nitriding; structure of nitride layer; influence of temperature and method on nitriding process; strength of steel after nitriding; influence of cooling and tempering; metallographic examination.
(J28k; ST, SGB-s)

137-J. Symposium on Annealing of Low Carbon Steel. G. W. Form and E. B. Evans. *Industrial Heating,* v. 25, Mar. 1958, p. 523-538, 626; Apr. 1958, p. 739-744.

Effect of cold work, aging effects, effect of crystal directionality, effect of gas flow in melting, effect of variables in hot mill processing, effects of atmosphere, effect of various cycles. (J23, CN-g)

138-J. Automation in Heating and Quenching. Norbert K. Koebel. *Industrial Heating,* v. 25, Apr. 1958, p. 682-694, 836.

(To be continued.)
(J-general, J26, 18-74)

139-J.* Metallurgy of Tempering and Annealing in Fractional Minutes. R. K. Wuerfel. *Metal Progress,* v. 73, Apr. 1958, p. 93-96.

Conditions for annealing nonferrous metals and tempering steels can be put on master curves. Tests were made to show that the optimum time for annealing or tempering by fractional-minute induction heating can be calculated.
(J2g, J23, J29, 3-67)

140-J. Re-Nitriding of Steel. G. J. Cox. *Metal Treatment and Drop Forging,* v. 25, Feb. 1958, p. 47-51.

(J28k; ST)

141-J. Oils for the Quenching of Steel. H. E. Priston. *Metal Treatment and Drop Forging,* v. 25, Feb. 1958, p. 57-64.

(J26; W28p; ST)

142-J.* Russian Induction Hardening and Forming. K. Z. Shepelyakovski. *Metalworking Production,* v. 102, Mar. 21, 1958, p. 501-504.

Two-stage induction hardening used in the manufacture of gears and in forging and stamping operations. (J2g, T7a, F21b)

143-J. (English.) **Grain Boundary Effect in Anneal Hardening of Alpha-Brass.** Gunji Shinoda and Yoshitsugu Amano. *Osaka University, Technology Reports,* v. 6, Oct. 1956, p. 299-307.

6 ref. (J23, M27f, Cu-N)

144-J. Case Hardening "Hardened" Rods. Andreas Luksch and Paul B. Wallace. *Metal Treating,* v. 9, Mar-Apr. 1958, p. 6-7.

(J28; ST, 4-55)

145-J. Salt Baths and Salt Bath Furnaces. Pt. B. Salt Bath Furnaces. Haig Solakian. *Metal Treating,* v. 9, Mar-Apr. 1958, p. 8-9, 38-39, 52-53.

Conclusion. (J2j, W27m)

146-J.* Distortion and Cracking. F. D. Waterfall. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 97-100.

Distortion and cracking during heat treatment result from changes in shape and volume due to transformations and methods of heating and cooling.
(J-general, 9-74, 9-72; ST)

147-J. Re-Nitriding of Steel. G. J. Cox. *Metal Treatment and Drop Forging,* v. 25, Mar. 1958, p. 101-106.

Chromium-molybdenum and Cr-Mo-V steels may be denitrided at 1000° C., machined and renitrided to provide a hard surface, while Al-containing steels do not respond to this treatment.
(J28k; AY, *Cr, Mo, V*)

148-J.* A Contribution to the Hardenability Problem in Titanium Alloys. R. P. Elliott and W. Rostoker. *American Society for Metals, Transactions,* Preprint no. 76, v. 51, 1957, 22 p.

Analysis of cooling curves of unalloyed Ti and two alloys containing 5% and 20% V, respectively, demonstrates that thermal diffusivity cannot be considered constant for all alloys. Two methods which permit the determination of thermal diffusivity, alpha, and quench severity, H, from quenching experiments; some characteristic values of alpha and H. 7 ref. (J5; Ti-b)

149-J.* Some Experiments on the Cause of Peeling in Whiteheart Malleable Cast Iron. C. T. Moore. *British Foundryman,* v. 51, Mar. 1958, p. 137-148.

Decarburization experiments performed upon excess-sulphur whiteheart iron on dry and moist Co-Co_2 atmospheres containing SO_2 indicate that amount and depth of sulphide penetration is greater with high CO_2 contents. (J4a; CI-s)

150-J. Induction Heating of Cast Steel Ingots. Michael C. D. Hobbs. *Canadian Metalworking,* v. 21, Apr. 1958, p. 32.

(J2g, F21b; ST, 5-59)

151-J. Carburizing-Martempering Treatment for Crankshafts in New Type of Salt Bath Line. *Industrial Heating,* v. 25, Feb. 1958, p. 284-286.

(J28q; J26p, W27m; ST)

152-J.* Distortion and Cracking. F. D. Waterfall. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 139-144.

Martempering reduces distortion occurring in hardening, and is applicable to small sections of water hardened steel, most sizes of oil-hardened steel, and all sections of Au-hardened steels. Causes of cracking during quenching, cracking during cooling (following carburizing), and cracking during grinding. (Concluded.)
(J26p, 9-72, 9-74; ST)

153-J.* Flame Hardening. G. Meredith. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 151-156.

Advantages for certain applications in relation to the principles of the method. Equipment required for general work and for special applications, points to be observed in hardening different ferrous materials. (J2h, 1-52)

154-J. Aluminum Plate Production. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 163-168.

Thick, high-strength Al alloy plate for machining into integrally stiffened wing skins and similar aircraft parts, and Al plate in the medium-strength alloys, in wider sizes for the shipbuilding industry. Heat treatment, quenching, stress-relief by stretching and ultrasonic inspection processes.

(J27, J26, J1a, S13g; Al-b, 4-53)

155-J.* Effect of Heat Treatment on the Microstructure and Low-Temperature Properties of Pressure-Vessel Steels. J. H. Gross, E. H. Kottcamp and R. D. Stout. *Welding Journal,* v. 37, Apr. 1958, p. 160s-168s.

Specimens of ASTM A285, ASTM A212, ASTM A203, ASTM A302, ASTM A387, 48s5, HY65, HY 80 and T1 steels were austenitized, cooled at various rates and stress relieved. Data obtained include tensile properties, transition temperatures, notch toughness, end quenched characteristics and microstructures of these steels following various cooling and stress-relieving sequences. 4 ref.
(J22, J1a, Q-general, 2-63, M27; AY)

156-J.* Quantitative Evaluation of Residual Stress Relief in Pipe Weldments. Jack E. Cook and Roy B. McCauley. *Welding Journal,* v. 37, Apr. 1958, p. 179s-184s.

Study of distribution and relief of residual stress in 4-in. diameter SA 106 schedule 80 pipe butt welds. X-ray diffraction analysis used for quantitative measurement of residual stress. Effect of temperature, soak time and rate of heating on stress relief. 4 ref.
(J1a; AY, 4-60, 7-51)

157-J.* (Czech.) **Effect of High-Temperature Annealing on Transformer Sheet Properties.** Jan Kolofik. *Hutnické Listy,* v. 13, Mar. 1958, p. 241-245.

Heat treatment research showed possibility of reduction of watt losses to 0.9 w. per kg. In industrial annealing in large furnaces, equal temperature distribution and as high a vacuum is not possible, but losses of 1.00 w./per kg. are possible. For production of transformer sheets of same quality as produced abroad, units for high-temperature annealing in vacuum are necessary. Sheets with lower Al content can also be annealed by this process. 15 ref.
(J23; ST, SGA-n)

158-J. (German.) **Regulating Salt Baths for Heat Treatment.** Otto Schaaber. *Draht,* v. 9, Mar. 1958, p. 85-89.

Methods, using thin foils, rods or wire meshes, for accurately controlling the bath's carbon potential, which is a measure of the carburization obtainable with the bath. (To be continued.) (J2j, 1-52)

159-J.* (German.) **Controlled Atmospheres and Their Use.** O. E. Cullen. *Industrieblatt,* v. 58, Mar. 1958, p. 17-21.

Composition of a suitable atmosphere, its production and use in carburizing, carbonitriding, recarburizing and transcarburizing. Operating conditions. (J2k, J28; ST)

160-J.* (German.) **Carbonitriding at Temperatures Below A_1 in Salt Bath With Elevated KCNO Content.** F. W. Eysell. *Industrieblatt,* v. 58, Mar. 1958, p. 21-24.

Effect of bath composition on the formation of martensite zones. Ef-

fect of treatment duration and temperature. Bath control; properties of carbonitriding layers; dimensional alteration in carbonitriding. (J28m, J2j; ST)

161-J. (Russian.) **Annealing of Cold Rolled Sheet Steel.** V. K. Barzii and S. S. Kolot. *Stal',* Feb. 1958, p. 159-161.

Effect of annealing conditions on yield point and ferrite grain size of cold rolled sheet steel. (J23; ST, 4-53)

162-J.* (Swedish.) **Stress Relief of Stainless Steel Strips by Tempering.** F. deKazinczy. *Jernkontorets Annaler,* v. 142, Jan. 1958, p. 5-14.

Determination of internal stress distribution after cold rolling and tempering. Body stresses started to decrease below 100° C., and decreased to about half of their original value at 150°. Stresses produced by balancing external forces relax at higher temperatures. Both types can occur simultaneously. 5 ref. (J1a, Q25k; SS)

163-J. Precipitation and Magnetic Annealing in a Cu-Co Alloy. J. J. Becker. *AIME Transactions,* v. 212, Feb. 1958, p. 138-144.

Changes in magnetic properties with particle size are used to study the precipitation process in a Cu-Co alloy. In particular, the effect of a field during aging in producing anisotropy is shown to occur entirely during the growth of the particles, after precipitation is complete. 15 ref. (J23, N7, P16; Cu, Co)

164-J.* Tool Steel Development. A. P. T. Taylor-Gill. *Birmingham Metallurgical Society, Journal,* v. 38, Mar. 1958, p. 3-26.

Desirable microstructure for toolsteels with regard to service requirements including wear resistance, shock loading and hardness; times and temperatures of preheat, austenitizing, interrupted quench, isothermal exposure, cooling and tempering treatments for achieving desired microstructures and dimensional stability in high speed hot work and cold work toolsteels. 9 ref. (J26, J29, M27, Q-general, TS)

165-J. Recent Developments in the Field of Malleable Cast Iron. K. Roesch. *Foundry Trade Journal,* v. 104, Apr. 24, 1958, p. 479-483.

(J-general, Q-general, P-general; CI-s)

166-J. Flame-Hardening in Germany. Hans Beike and Erich Zorn. *International Acetylene Association, Official Proceedings,* 1956, p. 84-96.

(J2h)

167-J.* High-Temperature Carburizing Takes Half the Time. P. M. Unterweiser. *Iron Age,* v. 18, May 22, 1958, p. 123-125.

Standard low-alloy steels such as 4620, 8620 and 9310 can be advantageously carburized at temperatures above the conventional carburizing temperature range (1700-1725° F.). A case depth normally achieved in 12 hr. can be attained in 6 hr. when carburizing temperature is increased to only 1800° F. (J28g, 2-62, AY)

168-J. Automatic Marquenching Solves Distortion Problem. *Machinery,* v. 64, Apr. 1958, p. 136-139.

(J26p; 9-74, ST)

169-J.* A Study of Temperature Uniformity in Heat Treating. Harold N. Ipsen. *Metal Progress,* v. 73, May 1958, p. 89-92.

Tests were made with and without forced convection to study variations in temperature reached by parts in center and edge of a work basket of steel stampings. Nonuniform heating can result in appreciable difference in the structure and properties of heat treated parts. (J28, P11k, W27n; ST)

170-J. Sub-Zero Quenching and Cold Cycling. *Scientific Lubrication,* v. 10, Feb. 1958, p. 24-26.

New quenching method, applied to Al, steel, Ti and phenolic materials, improves finishes and prevents many breakages during forming operation. (J26q; 2-63)

171-J. Heating Technique Minimizes Distortion. R. E. Wright and C. Schulenberg. *Steel,* v. 142, May 26, 1958, p. 102-103.

Process for hardening large gas turbine parts of Chromolloy steel includes heating in an atmosphere furnace, quenching in liquid carbon dioxide and proper fixturing. (J26; AY, *Cr, Mo, V*)

172-J. Vacuum Processing Improves Material and Product Quality. Robert F. Gunow. *Tool Engineer,* v. 40, May 1958, p. 112-114.

Requirements of vacuum heat treating and brazing furnaces are heating source, a sealed chamber

and a pumping system. "Hard to braze alloys" respond favorably to vacuum processing. Cu, Ag, Ni and Au-base alloys are used extensively. (J-general, W27, 1-73, K8j; Cu, Ag, Ni, Au)

173-J. Principles and Application of Heat Treatment for Titanium Alloys. A. J. Griest and P. D. Frost. Battelle Memorial Institute. *U. S. Office of Technical Services*, PB 121636, Dec. 1957, 132 p. $3.50.

(J-general; Ti)

174-J. Age-Hardening Characteristics of a Cast Alloy of Copper-6 Percent Titanium. N. Hehner, H. McCurdy and R. Edelman. Frankford Arsenal. *U. S. Office of Technical Services*, PB 131297, July 1956, 16 p. $.50.

Possibility of using Ti scrap as a hardener for metal alloys.
(J27d, Q-general; Cu, *Ti*)

175-J. Investigation of Beta Phase "Recrystallization" in Ti-3% Al-5% Cr Alloy. K. B. Lloyd and E. J. Chapin. Naval Research Laboratory. *U. S. Office of Technical Services*, PB 131338, Nov. 1957, 22 p. $.75.

Possibility of controlling the beta grain size during heat treatment of binary and ternary Ti alloys with Al and Cr; effects on mechanical properties.
(J27, N3, Q-general; Ti-b)

176-J. Improved Equipment, Material Standards, Inspection Needed for Metal Treating. Ben Berlien. *Western Metalworking*, v. 16, Apr. 1958, p. 60-61.

(J-general, S22, 1-52)

177-J. Effect of Transformation of Ledeburite Upon the Stability of Ferrosilicon. I. N. Strukov and P. V. Gel'd. *Fizika Metallov I Metallovedenie*, v. 3, 1956, p. 564-565. (Henry Brutcher, Altadena, Calif., Translation no. 4154.)

Note on beneficial influence of an anneal at about 750° C. of ferrosilicons containing a ledeburite phase, on the one hand, and such impurities as Al, P, and Ca, on the other, upon various properties, particularly the thermo e.m.f., susceptibility to disintegration in humid atmospheres.
(J23, N6, 9-51; AD-n, Fe, Si)

178-J. Effect of Ultrasound on Various Changes in Steel at High Temperatures. S. Tanaka, T. Yoshida and K. Takagi. *Tetsu to Hagane*, v. 37, no. 10, 1951, p. 25-30. (Henry Brutcher, Altadena, Calif., Translation no. 4158.)

Effect of ultrasound upon changes in structure of steel being heat treated. (J-general, Q21f, 1-74; ST)

179-J. Chromized Steel of Higher Corrosion Resistance. N. F. Vyaznikov and A. N. Popandopulo. *Metallovedenie i Obrabotka Metallov*, no. 3, Mar. 1958, p. 61-62. (Henry Brutcher, Altadena, Calif., Translation no. 4169.)

Improvement of corrosion resistance and surface hardness of chromized steel by additional carburizing.
(J28g, L15, R-general; ST, 8-65)

180-J. (French.) **Flame Hardening and Local Heat Treatment.** H. W. Gronegress. *Revue de Metallurgie*, v. 55, Mar. 1958, p. 211-217.

Jominy hardenability test makes it possible to predict the surface hardness and depth of hardening given by flame hardening of carbon and low-alloy steels. Long-time heating tests can be replaced by rapid tests using rotating burners. Surface hardness of high-alloy steels can be estimated, but not the hardening depth.
(J2h, J5; CN, AY)

181-J. (German.) **Annealing of Iron and Other Metals in Controlled Atmosphere Containers.** Werner Herdieckerhoff. *Draht*, v. 9, Apr. 1958, p. 141-143.

Use of high vacuum. (J23, 1-73)

182-J.* (German.) **Longer Tool Life Through Selective Electric-Spark Hardening.** E. Hanke. *Fertigungstechnik*, v. 8, Feb. 1958, p. 53-59.

Hardening occurs through electric discharges applied repeatedly to the bearing areas of the surface. Equipment used. Abrasion resistance of the treated surface increased by 100-450%. Micro-examination of tested surfaces showed that high surface hardness is due to the structural changes occurring during electric heating above the transformation range and then cooling, which causes a carbide particle precipitation in the treated metal and refutes the theory that surface hardening is caused by a hard metal layer deposited on the surface during treatment. 10 ref.
(J28n; TS)

183-J. (Rumanian.) **Effect of Silicon on the Heat Treatment of Nodular Cast Iron.** L. Sofroni, *Studii si Cercetari de Metalurgie*, v. 2, no. 1-2, 1957, p. 23-36.

8 ref. (J-general, 2-60; CI-r, Si)

184-J.* Alter Tool Structure for Longer Life. Herbert Chase. *Iron Age,* v. 181, Mar. 6, 1958, p. 117-119.

A new type of treatment called "Vitalizing" produces 100% martensite throughout the whole section of the tool, effecting a high degree of transformation. After treatment the tool makes from 75 to 400% more cuts per grind and can be reground until completely used up. Vitalizing is an electronic process employing a chemical bath.
(J-general, N8, CN, TS-m, SS)

185-J. Differential Annealing Makes Aluminum Fish Boxes Stronger; Often Cheaper. *Modern Metals,* v. 14, May 1958, p. 44, 46.

New method anneals only the rim of deep drawn blanks, resulting in deeper draws, more uniform strength distribution.
(J23, T29p, G4b, 17-57; Al-b)

186-J. Whys and Hows of Stress Relieving. Gerald Scott. *Welding Engineer,* v. 43, Apr. 1958, p. 47-50.
(J1a, K9p, K9q)

187-J. High-Frequency Heating Rate and Quenching Temperature for Pearlitic Gray Cast Iron. P. I. Rusin. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 53-56. (Henry Brutcher Altadena, Calif., Translation no. 4178.)

Study of thermal field in cast iron during hardening. Effect of temperature and heating speed on depth of the hardened and transition layers. Most suitable temperature is 980-1050°.
(J26, J2g; CI-n, 2-61)

188-J. High-Power Quenching Media. L. V. Petrash. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 56-61. (Henry Brutcher, Altadena, Calif., Translation no. 4179.)

Sources of error in determining cooling characteristics. Three stages of cooling. Maximum cooling speed lies at 140-250°. Effect of circulating and quiescent, hot and cold water. (J26)

189-J. (Russian.) **Abnormal Softening of Lead-Tin Alloys at Room Temperature.** L. N. Larikob. *Doklady Bolgarskoi Akademii Nauk,* v. 10, Jan-Feb. 1958, p. 65-68.

Use of natural aging process.
(J27d; Pb, Sn)

190-J.* How Hardening Media Function. *Aciers Fins & Speciaux,* no. 28, Mar. 1958, p. 88-93.

Principal factors relative to the hardening medium are: operating temperature; specific heat; thermal conductivity; viscosity; density; latent heat of vaporization. Factors relative to the hardening piece described. (J26, W28p; ST)

191-J.* New Facts on the Nitriding of 4140 and 4340. A. J. Schwarzkopf. *Iron Age,* v. 181, May 29, 1958, p. 90-93.

Both steels can be hardened to about Rockwell 80 to 90. Case hardness is dependent upon initial core hardness. (J28k; ST)

192-J. (Dutch.) **Annealing of Toolsteel.** J. J. van Herwijnen. *Metalen,* v. 13, Apr. 15, 1958, p. 124-128.

10 ref. (J23n, J23q; TS)

193-J. (French.) **Elimination of Cavities in Very Pure Aluminum.** M. Wintenberger. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 71-75.

(J23; Al-a)

194-J.* (French.) Influence of Quenching Conditions on Pre-Precipitation in Al-Zn Alloy Containing 10% Zn. René Graf. *Comptes Rendus,* v. 246, Mar. 10, 1958, p. 1544-1547.

When this alloy is quenched from different temperatures, speed of hardening is greatest around 460° C. This corresponds to a maximum size of zones of pre-precipitation. Existence of dislocations retained by quenching provides interpretation of results of this study. 9 ref.
(J26n, N7; Al-b, *Zn*)

195-J. The Effect of Final Annealing in a High Vacuum on the Magnetic Reversal Losses of Hot and Cold Rolled Transformer Plate. Franz Lihl. *Archiv für das Eisenhüttenwesen,* v. 28, Apr. 1957, p. 223-226. (Iron and Steel Institute Translation no. 570.)

Previously abstracted from original. See item 233-J, 1957.
(J23, 1-73, P16; Fe, 4-53)

196-J. Effect of Surface Hardening by Heating With Mains Frequency Current on the Properties of the Working Rolls for Cold Rolling. V. N. Novikov. *Metallovedenie i Obrabotka Metallov,* June 1956, p. 36-47. (Iron and Steel Institute Translation no. 780.)

Previously abstracted from original. See item 240-J, 1956.
(J2g, M27, W23k, CI)

197-J. Relief of Stresses in Quenched Carbon Toolsteel. A. A. Gol'denberg. *Metallovedenie i Obrabotka Metallov,* Feb. 1958, p. 6-11. (Henry Brutcher,

Altadena, Calif., Translation no. 4146.)
9 ref. (J1a; TS)

198-J. Induction Heating of Heavy Section Parts. V. V. Aleksandrov. *Metallovedenie i Obrabotka Metallov,* Feb. 1958, p. 23-28. (Henry Brutcher, Altadena, Calif., Translation no. 4149.)

As applied to large tubes and plates. (J2g; 4-53, 4-60)

199-J. Continuous Strip Annealing of Steel. E. J. Ocean and C. B. Kiehle. *Industrial Gas,* v. 36, Nov. 1957, p. 5-7, 20.

The three most widely used furnace types, six methods of heat application using natural gas as fuel and eight advantages of continuous process. (J23, 1-61, W27g; ST)

200-J. Opened Coil Annealing With Recuperative Heating Increases Production Capacity. *Industrial Heating,* v. 25, May, 1958, p. 949-950, 952, 954, 956, 958, 960.

(J23, W27; ST, 4-53)

201-J. Isothermal Annealing Below 60° K of Deuteron Irradiated Noble Metals. G. D. Magnuson, W. Palmer and J. S. Koehler. *Physical Review,* v. 109, Mar. 15, 1958, p. 1990-2002.

Foils of 99.999% pure Cu, 99.999% pure Ag, and a Cu alloy containing 3.78 at.% Ni were irradiated near liquid helium temperature with 10.7-Mev deuterons. Annealing up to 60° K. was performed in a series of isothermal steps. During each anneal the decrease of the radiation-induced resistivity increment with time was observed. 29 ref.
(J23; 2-67; Cu, Ag, 14-70)

202-J.* (French.) **The "Recovered State" Renews Transformation Conditions and Use Properties of Metals.** Jean Herenguel. *Revue de l'Aluminium,* v. 35, Apr. 1958, p. 405-416.

Structural evolution of partially annealed, cold worked metals and accompanying metallurgical phenomena. Relative mechanical properties of some Al and Cu alloys and conductor wires after conventional heat treatments and recovery-type treatments. Industrial possibilities. 10 ref. (J23, N4, Q-general; Al, Cu)

203-J. (Japanese.) **Study on Spheroidal Graphite Cast Iron. Pt. 1.** Hideji Hotta and Toru Saruwatari. *Japan Foundrymen's Society, Journal,* v. 30, Mar. 1958, p. 137-144.

Relationship between heat treatment and mechanical properties at room and high temperatures of spheroidal graphite cast iron melted in a heavy oil furnace. 10 ref.
(J-general, Q-general; CI-r)

204-J. Sub-Zero Quench Tames Formed Aluminum. R. J. Delaney. *American Machinist,* v. 102, June 16, 1958, p. 106-107.

(J26q, G1, G17, K3n, 2-63; Al-b)

205-J. Designing With Heat Treated Steels. John L. Everhart. *Materials in Design Engineering,* v. 47, June 1958, p. 121-136.

Results that can be achieved by annealing, normalizing, quenching and tempering, martempering and austempering. Heat treatments and the properties they give; selecting the steel and the design; fundamentals of the heat treatment of steel; definitions of heat treating terms. 12 ref. (J-general, Q-general; 17-51; ST, 2-64)

206-J. Heat Treating of Roller Bearings Is Geared to Automatic Production. Leo H. Everitt and O. E. Cullen. *Metal Progress,* v. 73, June 1958, p. 67-73.

Timken has unveiled its Bucyrus, Ohio, plant which has an annual capacity of 27,000,000 roller bearings. Production is completely automatic from machining through heat treating to packaging. Much of the success is credited to the push-button heat treat operation of five lines, using 22 furnaces for carburizing, hardening and tempering the bearing components.
(J26, J28, J29, T7d, 18-74, 1-52)

207-J. New Method Speeds Annealing. *Metal Progress,* v. 73, June 1958, p. 97-98.

Coils of carbon steel from cold mill are rewound to provide space between laminations. This speeds up heating and cooling, improves temperature uniformity. A recuperative method salvages heat from cooling coils for use in preheating cold coils. The new system promises a significant reduction in annealing costs. (J23; 1-55; ST, 4-53)

208-J. Two Steps to Heat Treat Savings. *Steel,* v. 142, June 16, 1958, p. 100-101.

Induction hardening of critical areas of automotive steering knuckles to boost fatigue life permits use of less expensive steel; a switch from press quenching to hot oil quenching. (J2g, J26n, T21c; ST)

209-J. Grain Refinement of Uranium by Heat-Treatment and Alloying. E. E. Hayes. Paper from "Fuel Ele-

ments Conference", U. S. Office of Technical Services, TID-7546, p. 75-101.

Practical refinement of grain structures in unalloyed uranium is based on rapid cooling through the beta-alpha phase transformation. Additional refinement of rapidly cooled uranium may be obtained by a recrystallization process during a short-time anneal in the high-alpha phase. Alloys of uranium containing up to several per cent additive that can be used for grain-size control. Chromium, silicon and zirconium are among the most effective grain-refining elements. 15 ref. (J26, J23, M27c; U, AD-p35)

210-J. (Dutch.) **Air Flame Hardening of Rails for Curves.** H. W. Ruddy. *Lastechniek,* v. 24, May 1958, p. 89-92.

(J2h, T23q)

211-J.* (German.) **Austenitizing During Rapid Heating.** A. Rose. *Das Industrieblatt,* v. 58, Apr. 1958, p. 160-166.

Flame hardening as a rapid heating method. Investigation of austenite formation on subeutectoid steels. Decomposition diagrams showing transformation during austenitizing. Kinetics of austenite formation. Heating process in flame hardening. Austenite formation during flame hardening. Effect of starting structure. (J2h, N8f; ST)

212-J.* (German.) **Application of Radiochemical Methods in Study of Carburization.** H. Ornig. *Das Industrieblatt,* v. 58, Apr. 1958, p. HT 27-30.

Application of carbon-14 in study of carburization problems. Investigation on mechanism of carburizing and role of sodium carbonate. Carbon atom exchange between sodium carbonate and sodium cyanide. 8 ref. (J28g, 1-59)

213-J. (German.) **Progress in Gas Carburizing in British Timken Ltd.** J. H. Evans. *Das Industrieblatt,* v. 58, Apr. 1958, p. HT 31-32.

(J28g, T7d)

214-J.* **Effect of Carbon on the Grain Refinement of Uranium.** L. M. Howe. *Atomic Energy of Canada Limited,* CRMet-751, Apr. 1958, 25 p.

Grain is refined in samples which have been quenched from the beta phase and annealed at high alpha-phase temperatures. Study of microstructures supports a recrystallization mechanism for this grain refinement. The effect of carbon content on the magnitude of grain refinement in the surface layers is small whereas the effect on the interior of the sample is large; the degree of refinement increased with increasing carbon content within the range 10 to 1000 ppm. 8 ref. (J26, J23, M27c, 2-60; U, C)

215-J.* **The Annealing Control of Malleable Cast Iron Pipe Fittings.** Daizaburo Koyama. *Hitachi Review,* v. 7, Mar. 1958, p. 21-25.

Annealing malleable iron in a tunnel-type furnace; control factors; heat cycle, fuel economy, chemical composition. Controlling the chemical composition, Si in particular, is the most important factor. 15 ref. (J23; CI-s)

216-J. **Combine Nitriding, Induction Hardening on Low-Alloy Steel.** P. M. Unterweiser. *Iron Age,* v. 181, June 19, 1958, p. 122-124.

(J28k, J2g; AY-b)

217-J. **Carburizing of Steel: Methods, Properties and Applications.** A. G. Gardner. *Mechanical World and Engineering Record,* v. 138, May 1958, p. 201-205.

Applications and advantages in the light of recent improvements. (J28g; ST)

218-J.* **Liquid Metal and Salt Baths.** A. D. Hopkins. *Metal Treatment and Drop Forging,* v. 25, May 1958, p. 197-204.

Lead baths, cyanide-containing salt baths for case hardening, neutral salts for hardening and annealing, nitriding baths and "Sulfinuz" baths. Fluctuation of type and depth of case resulting from carburizing or nitriding baths of various concentrations with changes in treatment time and temperature. Advantages of neutral salts for hardening, hypothermal transformations, tempering or annealing. (J2j, J28, W28p)

219-J.* (German.) **Control of Salt Baths.** Otto Schaaber. *Draht,* v. 9, May 1958, p. 175-177.

Control of physical effect; heat transfer; composition of baths; direct and indirect measuring methods, measuring apparatus; effect of quenching speed and circulation speed; indirect method of bath evaluation by means of test hardening. (Concluded.) 15 ref. (J2j, S18)

220-J. **Toughening High-Strength Steel by Warm Working.** E. J. Ripling. *American Society for Testing Materials, Preprint,* no. 74, 1958, 10 p.

10 ref. (J2g, Q23; ST, SGB-a)

221-J. New Alloy Steels Beat Process Bugaboos. Pt. 2. D. B. Roach and A. M. Hall. *Chemical Engineering,* v. 65, June 2, 1958, p. 134-138.

High-strength precipitation-hardening stainless made by a simple heat treatment stands up to high-temperature, corrosive chemical process conditions.
(J27; SS, *Al, Cu, Mo*)

222-J. Magnetic Field Hardens Surface Skin. John C. Lewis. *Design Engineering,* v. 4, June 1958, p. 51-54.

Induction heating applications for hardening, forging, brazing and other fields. (J2g, F21b, K8k)

223-J. The Metallurgy of Tempering and Annealing in Fractional Minutes. R. K. Wuerfel. *Industrial Heating,* v. 25, June 1958, p. 1128-1130, 1132, 1134, 1136.

Master curves simplify the selection of tempering and annealing cycles. 4 ref. (J2g, J23, J29; ST)

224-J. New Horizons in Continuous Strip Heat Treatment. G. J. Langenderfer. *Industrial Heating,* v. 25, June 1958, p. 1168-1170, 1172, 1174, 1176, 1178.

Treating lines are operated by primary producers of both ferrous and nonferrous metal strip.
(J-general; 4-53)

225-J. The Production of Ball and Roller Bearings. *Machinery (London),* v. 92, June 1958, p. 1372-1380.

Methods and equipment employed by the Hoffmann Manufacturing Co., Ltd., Chelmsford, England.
(J28, T7d)

226-J. Harder Stainless Practical. Robert N. Libsch. *Steel,* v. 142, June 30, 1958, p. 85-86.

Method of nitriding using both salt bath and gas treatment applicable to all types of stainless steel. (J28k; SS)

227-J. Magnetometric Study of Electric Heating for Tempering of Steel. V. N. Gridnes, V. G. Permyakov and V. T. Cherepin. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 9-16. (Henry Brutcher, Altadena, Calif., Translation no. 4182.)

Processes occurring during the high-speed electric heating of quenched carbon steel and the phase composition resulting from heating to different temperatures were studied with the aid of a differential magnetic method. 9 ref.
(J29, N8a; CN)

228-J. Isothermal Bright Quenching of Cold Coiled Springs of 60C2A Steel. B. V. Venkov, I. I. Borisova and M. A. Noskova. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 44-45. (Henry Brutcher, Altadena, Calif., Translation no. 4187.)

Method of constant-temperature bright quenching applied to cold coiled spring of wire up to 6 mm. section was found to reduce the number of labor-consuming operations and lower production costs.
(J26n, T7c; ST)

229-J. Improved Heat Treating Practices for Some Forged Auto Parts. A. E. Shevelev. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 45-49. (Henry Brutcher, Altadena, Calif., Translation no. 4188.)

The stability of the austenite in the normalizing and heat treating of a forging depends on the preceding hot plastic deformation; the greater the degree of forging the greater the magnitude of the residual stresses and the less stable the austenite. An increase in the austenitization temperature or in the exposure time to austenitization leads to partial decomposition of the solid solution and the precipitation of ferrite, the intensity of the process increasing with the austenitization temperature.
(J22, N8, T21c; ST, 4-51)

230-J. (German.) **Control of Salt Baths for Heat Treatment.** Otto Schaaber. *Draht Fachzeitschrift,* v. 9, Mar. 1958, p. 85-89.

(J2j)

231-J. (German.) **Applications of Electrical Heating in a Steel Mill.** F. Hahne and H. Schmitz. *Elektro-Wärme,* v. 16, Mar. 1958, p. 62-67.

(J-general, F21b, W27j; ST)

232-J. (German.) **Applications of Electrical Heating in a Tube Plant.** E. Hörmann. *Elektro-Wärme,* v. 16, Mar. 1958, p. 68-71.

8 ref. (J-general, F21b, W27j, 4-60)

233-J. (German.) **Economics of Energy Consumption in a Steel Mill With Special Reference to the Introduction of Electric Heating.** K. Sauer. *Elektro-Wärme,* v. 16, Mar. 1958, p. 71-75.

(J-general, F21b, W27j; ST)

234-J. (German.) **Applications of Electrical Heating in a Plant Producing Semifinished Light Alloy Parts.** H. H. Croseck. *Elektro-Wärme,* v. 16, Mar. 1958, p. 90-94.

(J-general, W27j; EG-a39)

235-J.* Tool Steel Failures: Cause and Remedy. Pt. 1. B. M. Hamilton. *Canadian Metalworking,* v. 21, June 1958, p. 8, 10, 12, 14.

Selection of toolsteel; correct heat treatment; grinding of hardened tools; design; operating conditions. Typical high speed, hot work and cold work steels described. (J-general; TS)

236-J.* Effects of Heat Treatment of Thin Ferromagnetic Films at Intermediate Temperatures. E. N. Mitchell. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 286-287.

Iron-nickel films deposited in vacuo in the presence of a magnetic field were annealed in an inert enviornment. When the annealing is performed in an orienting field of 30 o.e., initial magnetic properties of these films can be altered provided the initial temperature is high enough. If a field is applied at right angles to the original preferred direction and in the plane of the film, the magnitude of the magnetic anisotropy can be reduced without changing the preferred direction; the preferred direction of magnetization can be changed if the anneal temperature is sufficiently high. (J23, P16; Fe, Ni, 14-62)

237-J.* Controlled Atmospheres for Metallurgical Processes. Pt. 1. I. L. S. Golding. *Metal Treatment and Drop Forging,* v. 25, June 1958, p. 221-226.

Heat treatment processes which are best performed in neutral or active reducing atmospheres; underlying chemical reactions. (J2k)

238-J.* (French.) **Graphitizing in Salt Baths. Application to Cast Irons Having High Sulphur Content.** Olivier Bader and Daniel Godot. *Fonderie,* no. 148, May 1958, p. 211-214.

Economical process uses electrically heated furnace with electrodes immersed in annealing solution. Loading and unloading of parts is simple and flexible, temperature control easy; no wrapping of parts prior to treatment is required; surface oxidation is prevented by formation of thin film of salts which solidifies as parts leave furnace; salt is easily recovered by mechanical methods; cooling can be by still or blown air or oil. 8 ref. (J2j; CI)

239-J.* (German.) **Isothermal Hardening of Case Hardened Steels.** K. H. Estermann. *Industrieblatt,* v. 58, May 1958, p. 185-189.

Test materials and experimental heat treatment; mechanical properties and metallography, applicability of the method in low and high-alloy steels. 4 ref. (J28, J26p; ST)

240-J. (Japanese.) **Surface Hardening of Stainless Steels.** T. Takase. *Metals,* v. 28, June 1958, p. 424-428.

Experimental results of nitride hardening of austenitic 18-8 stainless steel and induction hardening of 13% Cr martensitic stainless steel. (J28k, J2g; SS-c)

241-J.* Aging Practices for High Strength Ductile Aluminum Alloy HP 356. Alan B. DeRoss. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 565-569.

Alloy HP 356 exhibits superior ductility and improved tensile and yield strengths. Alloy XHP 356 with a nominal composition of 0.06% Mg, aged, will produce mechanical properties of unusually high strength with comparatively fair ductility. (J27d; Al-b)

242-J.* (Japanese.) **Diaphragms Made of Extremely Thin Beryllium Copper Strips.** J. Miyama, T. Ishihara and H. Utsumi. *Engineering, Research Institute in Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 85-88.

Temper hardening of the blank at 350° C. for 1-1.5 hr., heat treatment at 350° C. for 20 min. after forming and use of epoxy resins adhesives. (J29; Be, Cu)

243-J.* The Pack Carburizing and Annealing of 4½% Ni-Cr-Mo Case Hardening Steel. C. Dawes. *Metallurgia,* v. 58, July 1958, p. 3-9.

Various compounds have been used to carburize a 4½% Ni-Cr-Mo steel; influence of these on the "as-quenched" hardness, microstructure, carbon content and annealing characteristic of the carburized case. (J28g; AY)

244-J.* (German.) **Characteristic Quality of Oil-in-Water Emulsions for Quenching in Flame Hardening.** W. H. Kara and F. J. Overkott. *Industrieblatt,* v. 58, May 1958, p. 189-197.

Peculiarity of quenching in flame hardening; necessary properties of quenching emulsion; effect of water hardness and its control; other optimal conditions; experiments with tempered steels; effect of oil concentration, optimal concentration as dependent on steel composition. (J2h, J26, W28p; ST)

245-J.* (German.) **Ionitriding—Technique and Application of Method.** H. Beisswenger. *Industrieblatt,* v. 58, May 1958, p. HT 40-43.

Nitriding mechanism; technique of method; properties of nitrided materials; suitable steels. (J26k; ST)

246-J.* (Russian.) **Causes of Grinding Cracks and How to Eliminate Them.** G. L. Levin. *Vestnik Mashinostroeniya,* v. 38, June 1958, p. 55-57.

The following procedure in quenching plates has eliminated cracks: plates are placed in salt bath consisting of 40-48% sodium chloride, 46-48% calcinated soda and 3-4% sodium cyanide. The latter is added first at the start of the shift and again 4 hr. later. (J26, G18, 9-72)

247-J.* (German.) **Effect of Activating Additions in Solid Carburizers in the Recarburizing of Steels.** Peter Wincierz. *VDI-Zeitschrift,* v. 100, Jan. 1, 1958, p. 21-22.

Activating additions accelerate the recarburization of plain and alloy steel in charcoal. Oxygen content and heat of dissociation of the combinations determine the efficiency of oxide, carbonate and chloride (of Ba and Ca) additions. (J28g; ST)

248-J. Study of the Factors Influencing the Properties of Heat Treatable Titanium Sheet Alloys. R. S. Richards, D. L. Day and H. D. Kessler. Titanium Metals Corp. of America (Wright Air Development Center). *U. S. Office of Technical Services,* PB 131769, Mar. 1958, 280 p. $4.

Evaluation of factors which would influence the properties and subsequent heat treating response of Ti alloy sheet. Two highly heat treatable experimental sheet alloys, Ti-2Al-6Mo-2V and Ti-4Al-3Mo-1V, were examined. Effects of cold and warm rolling deformation on mechanical properties. Tensile and bend tests at room and high temperatures on materials annealed in the mill, solution treated and aged conditions. Studies of aging, strain rate effects, strain distribution in long tensile specimens, metallographic examination, dimensional stability measurements, dilatometric measurements during aging, stress-stability tests, modulus measurements and short-time exposure to high temperatures. (J-general, Q-general; Ti-b)

249-J. Open Coil Anneal System Designed for Steel Plant Operation. *Iron and Steel Engineer,* v. 35, June 1958, p. 151-152, 156, 158.

(J23, J2k; ST, 4-53)

250-J. Distortion Reduced by Automatic Marquenching. *Machinery (London),* v. 92, June 1958, p. 1472-1474.

Workpieces are immersed in oil maintained at a temperature equal to initial transformation value at which martensite begins to form in the carburized case. Results were achieved with automatically operated batch-loaded furnaces and a special-purpose quenching oil. (J26p)

251-J. An Automatic Austempering Plant. R. S. McFall. *Machinery (London),* v. 93, July 1958, p. 43-46.

In manufacture of typewriters, initial heating of the bars and final cleaning operations are accelerated by automatic machinery without affecting quality. (J26p; ST)

252-J. Heat Treating—Should You Do It Yourself? A. S. Eves. *Modern Machine Shop,* v. 31, June 1958, p. 106-115.

Several important factors which manufacturers should consider in deciding whether to do their own heat treating or subcontract it. (J-general, A5b)

253-J. Surface Hardening of Carbon Steels by High-Temperature Dry Cyaniding. O. K. Kotov. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 16-20. (Henry Brutcher, Altadena, Calif., Translation no. 4217.)

High-temperature dry cyaniding is an improvement on gaseous nitrocementation. Full saturation with nitrogen increases speed of diffusion and eliminates sooty deposits. Chief advantage is raising the fatigue limit. Wear resistance is increased 83% by case hardening, 93% by gaseous nitro-cementation and 172% by high-temperature gas nitro-carburization. 7 ref. (J28j, Q9; CN)

254-J.* (French.) **Method of Controlled Slack Quenching of Impact Test Bars.** Melvin R. Myerson and Samuel J. Rosenberg. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 318-322.

Modified end-quench procedure for producing uniform microstructure and hardness at notch points. Data on harmful effect of slack quenching on impact properties of some steels. (J26, Q6; ST)

255-J. (German.) **Blank Annealing in Electric Ovens.** O. Meyer-Witting. *Elektrowärme,* Jan. 1958, p. 4-12.

(J23; W27j)

256-J. (German.) **Convention on "Progress in Heat Treatment" in Warsaw, Poland, Oct. 7-8, 1957.** Hildegard Dittschlag. *Maschinenbau - Technik,* Dec. 1957, p. 668-669.

(J-general)

257-J. (German.) **Heat Treatment of Nodular Cast Iron.** J. Motz. *VDI-*

Berichte, v. 27 1958, p. 13-18.

13 ref. (J2; CI-r)

258-J. (German.) **Effective Hardening in Gas-Carburized Gear Wheels.** Heinz Glaubitz. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 216-226.

32 ref. (J28g, T7a)

259-J. (German.) **Soft-Nitriding and Sulphidizing—Two New Methods in the Treatment of Geared Parts.** Johannes Mueller. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 235-239.

Bath surface treatment method. 5 ref. (J28k, J2j, T7a; ST)

260-J. (German.) **Surface Hardening of Gear Wheels.** Erich Hoehne. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 241-248.

19 ref. (J2g, T7a)

261-J. (Japanese.) **Diaphragm Made of Extremely Thin Phosphor Bronze Strips.** J. Miyama, T. Ishihara and H. Utsumi. *Engineering Research Institute in Tokyo University, Annual Report*, v. 15, Mar. 1958, p. 89-92.

Heat treatment at 300° C. for 1 hr. is most suitable for 0.03-mm. phosphor bronze diaphragms. Diaphragms treated in this way show minimum dimensional changes and no hysterisis loop.
(J-general; Cu-s, *P*, 4-53)

262-J.* (Russian.) **Nitriding Steel Machine Tools to Increase Their Wear Resistance.** E. M. Morozova and F. R. Florensova. *Stanki i Instrument*, v. 29, June 1958, p. 28-31.

Heating with high-frequency current during nitriding as compared to heating in a furnace reduces nitriding time from 24 to 3 hr. Heating to 550° will increase surface hardness. Reduction of nitriding time increases resistance to plastic deformation, decreases tendency toward brittleness. (J28k, 1-69, 2-61, Q-general; TS)

263-J.* (German.) **Salt Bath Carbonitriding.** K. H. Kopietz. *Industrieblatt*, v. 58, June 25, 1958, p. HT45-46, HT47, HT49.

Advantages of carbonitriding; various procedures and resulting surface structures. Distribution of hardness on test pieces of C-15 steel. 7 ref. (J28m; ST)

264-J.* **Influence of Heat Treatment on Microstructure and High-Temperature Properties of a Nickel-Base Precipitation-Hardening Alloy.** R. F. Decker, John P. Rowe, W. C. Bigelow and J. W. Freeman. *National Advisory Committee for Aeronautics, Technical Note* 4329, 1958, 56 p.

Effect of various heat treatments on the rupture properties and microstructure of a 55Ni-20Cr-15Co-4Mo-3Ti-3Al alloy. Effects of variations in solution treatment, cooling rate after solution treatment, aging treatment on stress-rupture properties at 1600° F. and 25,000 psi. as related to variations in size and distribution of precipitates within the alloy and to residual rolling effects. (J27, M27, Q3; Ni-b, *Cr*, *Co*, *Mo*, *Ti*, *Al*, 2-64, 2-62)

265-J. **Structure of Steel. Pt. 6 and 7.** Edwin Gregory and Eric N. Simons. *Edgar Allen News*, v. 37, June 1958, p. 130-132.

Tempering, aging and precipitation; microstructure and solidification. (To be continued.)
(J-general, M27, N7, N12; ST)

266-J. **Expanded Application of Quenched and Tempered Steels.** J. M. Hodge and W. T. Lankford. *Engineering Sciences, Technical Paper*, v. 4, no. 5, 1957, 45 p.

9 ref. (J26; J29, 17-57; ST)

267-J. **Heat Treatment of Tool Steel.** C. Dasarathy. *Indian and Eastern Engineer*, v. 122, Apr. 1958, p. 213-216.

Metallurgical aspects of hardening, tempering and quenching.
(J-general; TS)

268-J. **Annealing Cycles for Commercial and Drawing Quality Rimmed Steels.** Howard E. Miller. *Industrial Heating*, v. 25, July 1958, p. 1369-1370, 1372, 1374, 1376.

Annealing cycles, grain structure and corresponding hardness.
(J23; ST-d)

269-J. (German.) **Precipitation Kinetics of Supersaturated Solid Solutions in Copper-Tin Alloys.** Lucja Cieslak. *Bergakademie*, Dec. 1957, p. 616-618.

(J27; Cu, *Sn*)

270-J. (German.) **Determination of Quenching Ability of Hardening Oils. Pt. 1. New Method Based on Measurement of Absorbed Heat.** R. Fischer and O. Schaaber. *Industrieblatt*, v. 58, May 1958, p. HT 35-37.

The interrupted quench method.
(J26p, W28p)

271-J. (Japanese.) **Cyclone Furnace Method of Iron Manufacture.** Y. Nokiwa. *Metals*, v. 28, June 1958, p. 448-451.

Advantages and disadvantages.
(J-general; CI)

272-J. (Russian.) **Electron Microscope and X-Ray Study of Aging of Al-Ag Alloys.** R. M. Lerinman and N. N. Buinov. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 279-292.

Al alloys with 20% Ag become considerably strengthened in aging process. Comparison of electron microscopic structural changes at different stages of aging process with unchanging anamolous diffraction effects on radiograms shows that the results from both methods of investigation fully correspond. 25 ref. (J27d; *Ag*, Al-b)

273-J.* **Protective Gases, Their Production and Application.** Gerhard Simon. *AEG Progress*, no. 5, 1957, p. 234-240.

Oxidation of metallic materials during heat treatment can be avoided when carried out in a vacuum, a salt bath or protective atmosphere. The latter, with pure H_2, mixtures of N_2 and H_2 or H_2, N_2, CO and CO_2 with the products NH_3, town gas or propane, attained its highest degree of technical and economic importance after equipment was developed and the production became simple and cheap. Methods of production. Types of furnace for their use. (J2k)

274-J.* (Russian.) **Formation of Nonuniformity in Fusing Zone of Weld.** L. S. Livshits and S. I. Panich. *Svarochnoe Proizvodstvo*, Apr. 1958, p. 22-25.

Heating welds to temperatures of 500 to 700° can produce carbon flow from one part of weld to another and leads to strong chemical and structural nonuniformity in fusing zone. After-heating to 950° will deconcentrate carbon and eliminate nonuniformity. 5 ref.
(J-general; ST, 7-51)

275-J. (Book.) **Definitions of Terms Used in the Heat Treatment and Testing of Metals.** 2nd Ed., 88 p., 1957. Australian Institute of Metals, 18 Queen St., Melbourne, C1, Australia.

Chemical, physical and mechanical properties connected with heat treatment. (J-general; 11-67)

276-J.* **Stress Relieving of Stainless Steels and the Associated Metallurgy.** R. A. Huseby. *Welding Journal*, v. 37, July 1958, p. 304s-315s.

Mechanical properties of the austenitic Cr-Ni stainless steels appear to be only mildly affected by fabricating operations; stress relieving usually is employed only for conditions where severe stress corrosion may be encountered, or for a high degree of dimensional stability. Thermal stress relieving of the ferritic Cr stainless steels after fabrication is necessary to obtain the desired mechanical properties and corrosion resistance. Martensitic stainless steels require preheating and high interpass temperatures during welding and immediate postheating after welding to avoid cracking. 19 ref.
(J1a, K-general; SS)

277-J.* (Italian.) **Carbonitriding Process.** G. Limentani. *Metallurgia Italiana*, v. 50, May 1958, p. 191-195.

Process and properties imparted to steel and alloy steel parts; residual austenite and methods of reducing same to minimum; tempering characteristics of carbonitrided steels as compared with those of casehardened steels. Description of carbonitriding furnace.
(J28m, W27n; ST)

278-J.* **Getting the Most From a Drying System.** James E. Greever. *Metal Progress*, v. 74, July 1958, p. 83-85.

Very low dew points (−95° F.) are required for the manufacture of transistor metals, annealing stainless, and sintering many powder compacts. Even a well-designed drying system will fail to produce such gas unless the purging gas used while regenerating the activated alumina silica gel is equally dry. (J2k, W28q)

279-J.* **Heat Treating Affects Aluminum Extrusions.** J. K. McLaughlin. *Metal Progress*, v. 74, July 1958, p. 105-107.

Aluminum extruders like to "homogenize" 6063 Al billets before extruding (this raises the strength of the product). Treatment discussed, along with the quantitative effects of several variables.
(J21; F24; Al-b)

280-J.* (German.) **Nitriding Titanium Steels.** L. Gillemot and M. Tomory. *Periodica Polytechnica*, v. 2, no. 1, 1958, p. 1-17.

Titanium steels require less nitriding time and the Ti:C ratio determines the resulting surface hardness. On steels with Ti:C $<$ 4 the

nitriding produces a comparatively soft layer with gradual transition to the core; in steels with Ti:C > 4, it produces a harder layer. The hardness increases with increasing Ti:C ratio. Test nitrided bars with sharp notches show approximately 50% greater fatigue limit than annealed unalloyed steel. 19 ref.
(J28k; AY, *Ti*)

281-J.* (German.) **Effect of Annealing on the Precipitation of Aluminum Nitride and on the Mechanical Properties of Plain Carbon Steels.** Paul Werthebach and Hubert Hoff. *Stahl und Eisen,* v. 78, May 29, 1958, p. 736-743.

Influence of temperature used in rolling and heat treating on the amount of nitrogen combined with Al in blown steels and openhearth steels containing 0.06 to 0.42% C, 0.04 to 0.17% Si, 0.4 to 0.32% Mn, 0.04 to 0.20% Al and 0.003 to 0.011% N. Rate of dissolution of aluminum nitride during heating and rate of precipitation in cooling at various temperature ranges. Relates the fixation of nitrogen to Al in deep drawing steels to the elongation in the yield point range and the formation of stretcher lines. Relation between the susceptibility to aging and the difference in the tensile strength at 20 and 200° C. Effect of the normalizing treatment of steels containing Al on the notch toughness and grain size.
(J23, J24, Q-general; CN, *Al, N*)

282-J. Surface Hardening of Titanium in Fused Borax. A. N. Minkevich and Yu. N. Shul'ga. *Metal Industry,* v. 93, July 25, 1958, p. 67-69. (From Metallovedenie i Obrabotka Metallov, Dec. 1957, p. 56-61.)

Previously abstracted from original. See item 122-J, 1958.
(J28; Ti, NM-a33)

283-J. Heat Treatment of MST 6Al-4V Titanium Alloy. S. R. Seagle, G. W. Bauer and D. Evers. *Metal Treating,* v. 9, July-Aug. 1958, p. 4, 6-7.

(J-general, Q-general; Ti-b)

284-J. High Temperature Carburizing Is Practical. *Steel,* v. 143, Aug. 4, 1958, p. 98-100.

Tests on AISI 1117 carbon steel, 4615 Ni-Mo steel and Ni-Cr-Mo steels 8620, 9315. (J28g, 1-66; CN, AY)

285-J.* (German.) **Effect of Working Conditions on Mechanical Properties When Patenting Rope Wires After Electric Resistance Heating.** Werner Lueg and Karl Schemmer. *Stahl und Eisen,* v. 78, July 10, 1958, p. 960-965.

Process of patenting 0.4, 0.6 and 0.8% carbon steel wires, prepatented, rolled and drawn into 3-mm. rope wires after direct resistance heating at 20 to 50 m. per min. and temperatures from 20° C. over Ac_3 to 1000° C., and indirect resistance heating in gas oven at 10 m. per min. and 880° C. Wires, drawn 12 times and reduced by 93% to 0.75 mm., were examined after each pull to detect influence of patenting process on mechanical properties. Patenting preceded by resistance heating generally improves the wire and diminishes dispersion as long as operating conditions permit an almost complete austenitization and extensive isothermal conversion when passing through quenching bath.
(J25, Q-general, 3-68; ST, 4-61)

286-J.* (Russian.) **Speeding the Aging Process of Aluminum-Magnesium Alloys by Small Admixtures of Silver and Zinc.** V. I. Arkharov, I. P. Berenova and L. M. Magat. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 516-526.

By measuring the lattice parameters of hard alloys during aging it was established that admixtures of 0.2-1.0% Zn and Ag speed the aging process of Al-Mg alloys. Study of ternary system Al-Mg-Zn shows that major factor in speeding aging is the internal adsorption of Zn into periphery of crystals of decomposing hard alloy. 13 ref.
(J27d, M24c, 2-60; Al, Mg, *Ag, Zn*)

287-J. Accelerated Aging of Heat Resistant Nickel Alloys Under Effect of Ultrasonics. V. S. Ermakov and E. A. Al'ftan. *Metallovdenie i Obrabotka Metallov,* July 1958, p. 22-27. (Henry Brutcher, Altadena, Calif., Translation no. 4278.)

Ultrasonic waves of 20-26 kgts. frequency accelerate the aging process of alloys. Doubling the ultrasonic energy makes possible shortening of aging period by 40 to 50 times. Application of ultrasonics during aging at 800° makes it possible to eliminate effect of coagulation and hardening of alloy is 15 to 20 times faster than under usual procedure. 6 ref.
(J27d, 1-74; Ni-b)

288-J. Nitriding of High-Strength Magnesium Cast Iron. Yu. M. Lakh-

tin and D. S. Pinchuk. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 39-42. (Henry Brutcher, Altadena, Calif., Translation no. 4282.)

The nitrided surface of Mg-Fe has great hardness and corrosion risistance in water. Nitriding of nodular iron requires much less time than steel or usual irons; nitriding at 650° to obtain surface depth of 0.16 mm. requires only 1 hr. and for depth of 0.35 mm., 3 hr. For best nitriding results it is recommended that Mg-Fe with a ferrite pearlite base be used at a diffusion temperature of 720-740°. 5 ref. (J28k, Q29n; CI-r, *Mg*)

289-J. Improved Processing of Cold Rolling Roll Banks of 9XF Steel. I. E. Brainin, A. I. Kondrashov and V. A. Kharchenko. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 43-46. (Henry Brutcher, Altadena, Calif., Translation no. 4283.)

Use of 9XF steel made in basic openhearth has replaced eutectoid steels for roll banks because of its greater resistance to crack formation and flocculation. Rapid grain growth takes place at 950° when the secondary carbides dissolve in the austenite. Raising the austenizing temperature from 830 to 960° increases the stability of cooled austenite. The suggested two-stage isothermal treatment eliminates need for normalizing in order to destroy flocculation in carbide lattice. (J22, W23k; ST-e)

290-J. Effect of Heat Treatment on Wear Resistance of Steel in Soil Mass. N. M. Serpik and M. M. Kantor. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 46-50. (Henry Brutcher, Altadena, Calif., Translation no. 4284.)

Isothermal treatment of steels used in road building machinery produces greater wear resistance than usual hardening methods followed by tempering. Tests show that isothermally treated steel has 1.5 greater wear resistance than Lemesh (plowshare) steels. (J26p, Q9n; ST)

291-J. Effect of Barium Acetate on Activity of Hard Carburizers. L. K. Luksha. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 50-52. (Henry Brutcher, Altadena, Calif., Translation no. 4285.)

The high activity of carburizers (10-15% charcoal, 80% semi-coke from coal, barium acetate varying from 5-15%) as compared to carbonates is to be explained by the presence of acetone in the cementite formed during the decomposition of acetates. Presence of acetone in cementite permits elimination of charcoal and its replacement with material of high thermal conductivity. (J28g; ST)

292-J.* (Russian.) **Carbide Separation on Tempering of Alloy Steel.** A. V. Stepanov. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 59-61.

Carbide separation takes place in final stage of tempering. The transformation of the cementite in the carbide alloy and the formation of carbide crystals requires a minimum temperature of 500°. Hardness begins to develop in high-alloy steel following 1 hr. exposure to constant temperature of 500°. It reaches maximum hardness at 550-600°, but rapidly declines after 625°. 4 ref. (J29, N8a; AY)

293-J.* (French.) **Cold Working of Aluminum Alloys Facilitated by Solution Heat Treatment.** Blaise Cliche. *Ingenieur,* v. 44, Summer 1958, p. 40-42.

Solution heat treatment for 0.040-in. thick sheet of aged 24S-T3 Alclad, consists of 10-sec. immersion in solution of potassium nitrate and sodium nitrate heated to 280° C. and quench in cold water or air. Permits cold working during first 5 hr. after treatment. Rapid cooling affords greater ductility. Speed of cooling governs speed of reversion to mechanical characteristics of previous aged condition. (J2?a; Al-b)

294-J.* (French.) **Carburizing. Measurement of the Depth of Carburized Layers.** Gerard de Smet. *Pratique des Industries Mecaniques,* v. 44, Mar. 1958, p. 64-68.

Structural changes in carburized steel; surface and homogeneous carburizing. Destructive and nondestructive methods of determining depth and hardness of carburized zones, including 30-sec. method employing new device called "Testorgraf" developed in Germany. (J28g, 1-54; ST)

295-J.* (French.) **Five Years' Observation of the "Sulfinuz" Process.** Y. de Villemeur. *Revue de Mecanique,* v. 4, Jan-Mar. 1958, p. 16-22.

Description of process; micrographic study of surface hardened steel specimens. Anti-seizure prop-

erties and conformability of Sulfinuzed machine parts as shown by laboratory tests and on basis of actual working conditions.
(J4c, Q9; ST)

296-J. Automatic Controls Guarantee Top-Quality Carburizing. P. M. Unterweiser. *Iron Age,* v. 182, July 3, 1958, p. 61-63.

Large continuous carburizing furnaces featuring accurate control of dew point, maintained case depth and carbon content to close tolerances for alloy steel railroad bearings. (J28g, W27n, X7g; AY)

297-J. (Hungarian.) **Effect of Titanium on the Surface Properties of Case-Hardened Steels.** Janos Prohaszka. *Kohaszati Lapok,* v. 91, Apr. 1958, p. 180-186.

9 ref. (J28; ST, *Ti*)

298-J.* (German.) **Effect of Gas Nitriding and Salt Bath Nitriding on Properties of Structural Steels. Pt. 3.** H. Wiegand and M. Koch. *Metalloberflache,* v. 12, Aug. 1958, p. 225-230.

Bend tests indicate that strength increases rapidly during the first salt bath process but soon reaches a limit. In the gas process there is a slower increase, but strength increases (beyond the salt bath limit) by continuing the process over a longer period. With alloy steels in salt bath, it is advisable to keep temperature near lower limit for increased endurance strength.
(J28k; ST)

299-J.* (German.) **Intergranular Oxidation of Cr-Ni-W Steels.** P. Csokan. *Metalloberflache,* v. 12, Aug. 1958, p. 230-232.

Fatigue caused by decarburization investigated. The uniform tempered sorbite showed a surface zone characterized by a bright network of decarburized material, probably along the primary grain boundaries. Only the hardening process seemed to affect this structure. Experiments with Cu electroplating to exclude oxygen gave good results.
(J4a, Q7; AY)

300-J.* (German.) **Bright Annealing With Controlled Atmospheres.** O. Meyer-Witting. *Metallwaren-Industrie und Galvanotechnik,* v. 49, May 1958, p. 195-201.

Removal of vapors resulting from rolling and drawing lubricants from the heating chamber is necessary. Besides protection against oxygen, reducing, recarburizing and nitriding, effects are available by adjusting composition of the gas. Use of hydrogen and of mixtures of N, H, CO and CO_2 prepared by incomplete combustion of fuel gases. Steam content more harmful with higher annealing temperatures, and causes more oxidation with long than with short cooling periods. (J23a, J2k)

301-J. How to Harden Steel Rolls. C. J. McCormick. *Iron Age,* v. 182, Aug. 28, 1958, p. 60-62.
(J22, J26p, W23k; ST)

302-J.* (German.) **Heat Treating With Medium Frequency.** H. Krake, W. Seifert and J. Mainka. *Fertigungstechnik,* v. 8, July 1958, p. 319-323.

Experiments with rough-turned gear blanks of heat treatable steel C 45, performed in a medium-frequency induction with 125-kw. generator. Correct hardening temperature was 850-870° C. For a tensile strength of 75-85 kg. per sq. mm. the tempering range was 670-680° C. Water was used as a quenchant. Prerequisites for good results: equal heat distribution to all points; thermostatic control of temperature; sufficient supply of water to insure fast and thorough quenching; use of normalized (in this case at 900° C.) material.
(J2g, T7a; ST)

303-J. (Russian.) **Effect of Holding Time During Tempering on the Mechanical Properties of Various Steels.** V. N. Semirog-Orlik. *Trudy Instituta Stroitel'nykh Mekhanizatsiya Akademii Nauk, Ukraniskii SSR,* no. 22, 1956, p. 70-80.

Effect of prolonging (up to 240 min.) the tempering of steels U7A, U10, U12A and SHKH15 at 200° C. on the magnitude of the stresses set up under conditions of all-round irregular stressed state with various related strains. Test pieces were pressed in pairs from steel 20 which was subjected to compression. Strength of U7A steel decreases smoothly with an increase in holding time to 180 min. while being annealed at 200° C. In steels U10 and U12 there was a large drop in strength for the first 20 min., and in steel SHKH15 for the first 60 min. After holding for over 180 min. the strength of all steels remains stable or increases.
(J29, Q27a; ST)

304-J. (Russian.) **Dispersion Hardening of Magnetically Soft Iron.** N. F. Vyaznikov. *Trudy Leningradskogo Politekhnicheskogo Instituta,* no. 180, 1955, p. 68-73.

Effects of annealing temperature, time of soaking and cooling conditions on the value of magnetizing force and of the permeability of commercially pure iron. Magnetic properties of annealed iron are affected principally by residual stresses. Study of mechanical properties as functions of the cooling conditions during annealing.
(J23, P16, Q-general; Fe, SGA-n)

305-J. The Use of Steel Forgings at High Strength Levels. C. E. Moeller. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 22-29.

Evaluation of austempering as a practical method of heat treatment to the 260 to 280,000-psi strength range, in 4350 steel. Comparison of austempered with quenched and tempered 4350 and 4340 steel.
(J26p; ST, SGA-b, 4-51)

306-J. A Practical Application of the Holloman-Jaffe Parameter to the Tempering of Type 410 Stainless Steel. Charles F. Lewis. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 77-81.

Holloman-Jaffe tempering parameter has been found useful for type 410 stainless in those ranges where the hardness-temperature curve is moving very rapidly. Published data supplemented by shop observations are treated statistically to arrive at a curve relating final hardness and the parameter T (20 + log t). This in turn is superimposed on curves relating the parameter with time and temperature so as to arrive at a simultaneous solution of the parameteric equations for the hardness required. 5 ref.
(J29q, Q29n; SS)

307-J.* (German.) **High-Frequency Induction Gear Hardening Processes.** G. Benkowsky. *Fertigungstechnik,* v. 8, June 1958, p. 241-246.

Processes for multiple-tooth hardening; single-tooth hardening; base hardening; new method of double-frequency multiple-tooth hardening. Steels suited for high-frequency hardening; normalizing; required generator efficiency. Resulting distortion lies within allowed tolerances. (J2g, T7a; ST)

308-J.* **The Pack Carburizing and Annealing of 4¼% Ni-Cr-Mo Case Hardening Steel.** C. Dawes. *Metallurgia,* v. 58, Aug. 1958, p. 69-75.

Influence of various carburizing compounds on the "as-quenched" hardness, microstructure, carbon content and annealing characteristics of the carburized case. Recommendations for a carburizing compound which will prevent the formation of heavy carbide networks and for a standard annealing treatment. Recommended procedures for annealing. (J28g, J23; AY, *Ni, Mo, Cr*)

309-J.* (Japanese.) **Austempering of Spring Steel.** Tsuneo Maenaka. *Metals,* v. 28, July 1958, p. 518-523.

Austempering process should be studied using continuous cooling transformation curve. Heat bath must be kept around 350 to 400° C. It is governed by cooling velocity, secondary bath temperature and cooling solution. High percentage of Mn (0.7 to 1%) is good for slow cooling. Fatigue tests and impulse test show that austempering is much better than ordinary tempering. Other mechanical characteristics are almost the same in both methods. (J26p, N8; ST, SGA-b)

310-J.* (Japanese.) **Electrolytic Heat Treatment.** Hiroshi Susukida and Yoshio Sakumoto. *Metals,* v. 28, July 1958, p. 530-534.

Stationary bath type, rotary bath type, nozzle type. Voltage is about 200 v. Nozzle type is better than bath type when large pieces are tempered. Partial and surface treatments are possible. Depth and degree of treatment can be controlled. Heating causes no oxidation and is rapid. Electrolyte can be used as cooling solution. (J2)

311-J.* (Japanese.) **Tempering and Mechanical Characteristics of High-Temperature Spring Steel.** Hidetsugu Hotta. *Metals,* v. 28, July 1958, p. 545-548.

9% W-Cr-V steel, Si-Mn steel, 13% Cr steel and 18-4-1 standard high speed steel are examined. Tempering is done around 500 to 1000° C. and tested under 50 to 200 kg. stress, 500° C. Hardness, fatigue and impulse tests are done. The 9% W-Cr-V steel is better than the others. The best tempering temperature is 1100° C. followed by holding in a heat bath of 600° C. for 9% W-Cr-V steel.
(J29, Q-general; ST, SGA-b)

312-J.* (Polish.) **Influence of Tempering Upon the Properties of Steel With Bainitic Structure.** Fryderyk Staub and Jerzy Tymowski. *Hutnik,* v. 25, May 1958, p. 133-142.

Changes of structure and properties of steel hardened isothermally and tempered. Changes taking place in the bainitic core. Results of mechanical investigations and metallographic observations with electron microscope for four structural alloy steels. Conclusions regarding behavior of steel with bainitic structure upon tempering in comparison with hardened martensitic steel. 13 ref.
(J29, Q-general, N8m; ST)

313-J. Heat Treatment and Cleaning in Wire Production. Ernest Hague. *Metallurgia,* v. 58, Aug. 1958, p. 80-83.

Equipment and layout at Kingfield plant of Darwins Bright Steels Ltd. (J-general, L-general, 1-52, 4-61, 18-67)

314-J. (Russian.) **Low-Temperature Cyaniding of Casting Dies.** S. B. Svishchova and M. S. Barilo. *Vestnik Mashinostroeniya,* v. 38, Aug. 1958, p. 41-43.

Cyaniding surface of press form to 0.08-0.15 mm. thickness eliminates cracks and chemical interaction between dies and casting. 4 ref.
(J28j, W19n)

315-J.* Salt Bath Heat Treatment Versus Quench and Temper Standard and Pearlitic Malleable. P. W. Green. *Modern Castings,* v. 34, Oct. 1958, p. 41-46.

Manufacturing methods used in production of standard and pearlitic grades of malleable iron; physical property comparison between oil-quench and temper and isothermal salt transformation; comparison of microstructures, mechanical properties and hardness values obtained from the two heat treating techniques. (J26, J2j; CI-s)

316-J.* (French.) **Technical Prerequisites for Heat Treatment.** Jean Gonin and Gerard de Smet. *Machine Moderne,* no. 592, July 1958, p. 11-16.

Good furnaces, precision pyrometers and adequate quenching equipment are indispensable. Simple device for observation of recalescence effect. Rules for heating parts; no heating (except special steels), oxidation and decarburizing protection, no sudden temperature changes, necked-down sections protected with iron wire or asbestos braid. Distortion avoided by fixtures applied to part immediately after heating. Parts with tendency to distortion should not be heated on uneven furnace bottoms. (J-general, 1-52; ST)

317-J.* Generation and Use of Prepared Atmospheres in the Annealing of Low-Carbon Steel Strip. George J. Campbell. *Industrial Heating,* v. 25, Sept. 1958, p. 1749, 1750, 1752, 1754, 1758, 1760, 1762, 1764.

Practical use of prepared atmosphere in the batch annealing of tin plate and cold rolled sheet coils of low-carbon steel. The steps necessary to produce an acceptable gas and the effect on strip surface when gases vary beyond certain fixed chemical composition.
(J2k, J23; CN-g, 4-53)

318-J.* Mass Spheroidized Annealing of Alloy Seamless Tubing in Roller Hearth Furnace. Walter J. Assel. *Industrial Heating,* v. 25, Sept. 1958, p. 1769, 1770, 1772, 1774.

Hardening and annealing of alloy seamless tubing to spheroidized structure with minimum decarburization on both surfaces in a controlled atmosphere roller-hearth furnace. (J23r, J2k, W27g; AY, 4-60)

319-J.* Case History of Induction Hardening Large Drive Gear. Victor H. Pagano and Charles J. Kropf. *Metal Progress,* v. 74, Sept. 1958, p. 86-90.

Changing from carburizing to induction hardening permitted the use of less costly steels and saved 5 lb. of Ni and 0.3 lb. of Mo per gear. Heat treating time was decreased, material handling was simplified and it is claimed that the change resulted in a tenfold increase without sacrificing quality.
(J2g, T7a; ST)

320-J. Study of the Factors Influencing the Properties of Heat Treatable Titanium Sheet Alloys. R. S. Richards, D. L. Day and H. D. Kessler. Titanium Metals Corp. of America. *U. S. Office of Technical Services,* PB 131769, Mar. 1958, 279 p. $4.

Properties of two Ti sheet alloys, Ti-4Al-3Mo-1V and Ti-2Al-6Mo-2V investigated in the annealed, solution treated and aged conditions.
(J27; Ti-b, 4-53)

321-J. Softening High-Alloy Carburized Steels. Yu. G. Vyshkovskii. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 43-46. (Henry Brutcher, Altadena, Calif., Translation no. 4321.)

To prevent decarburization during heating, test pieces were coated with Cr (20 mk. thick). The microstructure of carburized steel has a notable effect on surace hardness after softening treatment. Increased hardness is conditioned by presence in carburized surface of increased amounts of residual austenite and free carbides. To obtain satisfactory results in the softening treatment and to shorten length of process, it is necessary to avoid supersaturation of cementite layers with carbon by using a low-intensity carburization procedure.
(J28g, Q29; ST)

322-J.* (Polish.) **Influence of Ultrasonics Upon the Carburization of Steel.** Waclaw Rozanski. *Archiwum Hutnictwa,* v. 3, no. 2, 1958, p. 125-146.

Specimens of low-carbon steel containing 0.12% C were treated in a carburizing medium of 70% charcoal, 20% barium carbonate and 10% sodium carbonate at temperatures from 850 to 1000° C. for times from 30 to 120 min. Ultrasonic generator was utilized to develop standing ultrasonic waves in specimens during carburizing. Effect of ultrasonics depended on values of tensions evoked. At small intensities, carbon diffusion and thickness of cemented layer increased. At higher values of ultrasonic intensities, graphitization occurred during cementation. Some specimens ruptured in places of greatest tension and graphitization. 15 ref.
(J28g, 1-74; CN-g)

323-J.* **The Application of Rate Process Theory to the Heat Treatment of Titanium Alloys.** N. M. Erkun. *American Society for Metals, Transactions,* v. 51, Preprint no. 90, 1958, 16 p.

Time-temperature relationship applied to the heat treatment of 1-in. round bars of C-120AV (Ti-6Al-4V) and C-135AMo (Ti-7Al-4Mo) alloys. Using the rate process equation and considering only overaged portion of the aging curves, the constant C in the aging parameter T (C + log t) was found to be 15 for C-120AV and 20 for C-135AMo. By making use of the aging parameters, tensile properties, hardness and impact values of both alloys were plotted to show the relationship between mechanical properties and aging times and temperature at a constant solution treatment. 12 ref.
(J27d, Q-general; Ti-b)

324-J.* **Multiplying Factors for the Calculation of Hardenability of Hypereutectoid Steels Hardened From 1700° F.** C. F. Jatczak and D. J. Girardi. *American Society for Metals, Transactions,* v. 51, Preprint no. 99, 1958, 15 p.

Hardenability effects of Mn, Si, Cr, Ni, and Mo, singly and in combination, were studied in 1% C steels by the end quench test at a quenching temperature of 1700° F. and from normalized and spheroidized prior structures. Two different sets of hardenability factors were derived. One set, based on a normalized prior structure, can be used to predict the case hardenability of carburizing steel grades at carbon levels of 0.75 to 1.25%, and the other, based on a spheroidized prior structure, is for the hardenability prediction of homogeneous hypereutectoid analyses, such as toolsteels. Hardenability factors were obtained for each element to a level of 1.50% or higher with the exception of Mo whose effect was determined up to 1%. 11 ref.
(J5, 2-60; AY)

325-J.* Mechanized Austempering of Steel Harrow Disks. *Metal Progress,* v. 74, Sept. 1958, p. 78-80.

Parts are heated to 1575° F. in a neutral salt bath for 1.6 min., then austempered at 750° F. in a nitrate salt for 6 min. The bainitic structure obtained prevents directional cracking. (J26p, 18-74; ST)

326-J. (Russian.) **Suitable Conditions for Induction Hardening of Equipment Parts.** A. M. Shirokov and A. N. Zannes. *Stal',* v. 18, Aug. 1958, p. 730-736.

Installation for induction hardening with power of 100 kvt. and frequency of 2500 Hertz hardens working surface to a depth of 2-4 mm. Durability is increased on the average 2-3 times. (J2g; ST)

327-J. (Slovene.) **Effect of Carburizing the Exterior Surface on the Deformation Process of Steel.** M. Zumer and V. Prosenc. *Rudarsko-Metalurski Zbornik,* no. 4, 1956, p. 327-335.

Specimens machined from 0.07% C steel were normalized and then

carburized at different holding times and temperatures. Tensile strength increased with increase both in holding time and temperature, whereas elongation drops sharply. After carburizing at 920° C. for 50 min. the yield point disappears completely. The decrease in plasticity after carburization can be explained by assuming that the slip planes cannot reach the outer surface because the hard carburized layer prevents it. (J28g, Q-general; ST)

328-J. Bath, Shaker or Salt? Sampling Selects Best Carburizing Method. *Metalworking,* v. 14, Oct. 1958, p. 7-9.

Statistical sampling of results of various heat treating methods permits application of appropriate system. Part size, volume and determining factors. (J28g, S12j)

329-J. Precipitation of Cu in Ge. Pt. 3. Quench Effects in Nearly Perfect Crystals. A. G. Tweet. *Physical Review,* v. 111, July 1, 1958, p. 67-71.

Electrically active metastable centers with energies very near the valence band are formed in the early stages of heat treatment of Cu-doped Ge at 500° C., and below. (J26, N7; Ge, *Cu*)

330-J. Dew Point Monitoring Pays Off. A. R. Keefe and M. R. Koehn. *Steel,* v. 143, Oct. 13, 1958, p. 100-101.

Dew points of furnace zones are monitored by recorders in heat treat office, bringing better quality carburizing at less cost. (J2k, X7g; ST)

331-J.* Practical Pointers for Profitable Heat Treating. A. S. Eves. *Modern Machine Shop,* v. 31, Nov. 1958, p. 108-115.

Tips for case hardening steel economically. Effect of the cooling rate; techniques for case hardening; cyaniding, light casing, aerocasing, carburizing, (pack and rotary), carbonitriding. It is found that "movement" is less when the case needed is shallow and when low heats can be used and if enough hardness can be obtained by quenching in hot oil or molten salts. (To be continued.) (J28; ST)

332-J.* (German-English.) Gas Carburizing and Carbonitriding. F. W. Haywood. *Harterei-Technische Mitteilungen,* v. 11, no. 2, 1958, p. 23-52.

Chemistry of box carburizing and gas carburizing. Formulas for computing carburizing time for any desired depth. Different carburizing atmospheres analyzed. Furnaces and plants. Chemistry of process and advantages of carbonitriding. 5 ref. (J28g)

333-J.* (German.) Preparation of Carburizing Gases. Theodor Schmidt. *Harterei-Technische Mitteilungen,* v. 11, no. 2, 1958, p. 9-22.

Composition of different gases such as Co, water gas, protective gases, methane, propane, city gas. Composition of the latter three gases when "adjusted" with charcoal at 1000° C. Plants for the preparation of methane-air and city gas-air mixtures. (J28g, B25)

334-J.* (German.) Hardening of Gear Wheels. Hans Sigwart. *Harterei-Technische Mitteilungen,* v. 12, no. 2, 1958, p. 9-22.

Residual compressive stresses in a case hardened part studied and applied to the stress situation in a case hardened gear tooth. As tests showed, the bending durability of teeth in gears made from 20MnCr5 steel decreased steadily with increasing depth of case, starting from a maximum of 70 kg. per sq. mm. at 0.2 mm. case depth. Properties of 20MnCr5 and other steels tested and compared. 6 ref. (J28, Q25h, T7a; ST)

335-J.* (Russian.) Effect of Ultrasonics on Diffusion Processes in Steels and Alloys at High Temperatures. G. I. Pogodin-Alekseev. *Metallovedenie i Obrabotka Metallov,* June 1958, p. 14-17. (Henry Brutcher, Altadena, Calif., Translation no. 4247.)

Samples were heated in an electric furnace and exposed to the action of ultrasonic vibrations produced by magnetostriction. For control parallel experiments were carried out without ultrasonics. In case hardening steel the case was deeper and its depth depended on the intensity of vibrations. Ultrasonics accelerates the aging process in alloys, increases hardness and reduces shock resistance. (J28, 1-74; ST)

336-J. Effect of Grain Size of 20Kh. Steel Cogwheels During Heat Treatment. N. M. Tarasov and M. R. Semenchenko. *Metallovedenie i Obrabotka Metallov,* no. 1, 1955. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(J-general, M27c; ST)

337-J. (Russian.) **Properties of Steel 45 With Boron.** Ya. E. Gol'dshtein, L. S. Lyakhovich, L. L. Pyatokova and G. M. Trusenev. *Stal'*, no. 5, 1957, p. 449-451.

Properties of steel 43R containing 0.002-0.006% B are compared with those of ST 45 and 45G2. The hardening capacity of ST 43R with B is considerably higher than that of ST 45 and somewhat lower than 45G2. The critical diameter on quenching in water is 18-20 mm. for ST 45 and 38 mm. for 45R. ST 45R and 45 have the same mechanical properties for specimens from heat treated billets 15 x 15 x 60 mm. (J26, Q-general; ST, *B*)

338-J.* **Process Speed.** *Iron Age*, v. 182, Nov. 6, 1958, p. 108-109.

Passing strip steel through 30 ft. of liquid sodium completes annealing process in 85% less time. High rate of heat transfer, low equipment cost. (J23, W28p, 1-61; ST, *Na*)

339-J* **Vacuum Heat Treating.** Roger R. Giler. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 161-167.

Applications of vacuum heat treating, evolution of commercial vacuum furnaces including double pump barrel and pit types; hot retort and cold retort types.
(J-general, W27, 1-73)

340-J. **Special Steels for Nitriding.** *Iron Age*, v. 182, Oct. 16, 1958, p. 198.

Special nitrided steels containing 0.85-1.20% Al provide an extremely hard surface. Because the nitrided layer is stressed in compression, its fatigue properties are excellent. There are four types of Nitralloy steels: Grades 135, 135 modified, Nitralloy N and Nitralloy EZ. Grades 135 and 135 modified are the most widely used, especially in the aircraft industry. (J28k; ST)

341-J. **Marquenching.** *Mechanical World and Engineering Record*, v. 138, Aug. 1958, p. 349-350.

Equipment and quenching media. Steels for which marquenching process is suitable. (J26p; ST)

342-J. **How to Check Commercial Salt Baths for Their Carbon Content.** B. Finnern. *Harterei-Technik & Warmebehandlung*, v. 2, no. 10, 1956, p. 99-100. (Henry Brutcher, Altadena, Calif., Translation no. 4306.)

Practical experience gained in continuous routine testing and control of carburizing power of carburizing baths, expressed by their carbon content, by use of the foil method. Effect of quantity of steel treated in baths on the latter's carbon value. Effect of carburizing time on carbon content of case, especially Cr-Mn and Cr-Ni carburizing steels. Special importance of control of bath for steels subjected to alternating stresses in service.
(J28g, W27m, S11)

343-J. **Stabilizing Heat Treatments of 5% Aluminum-Magnesium Alloys Against the Effects of Heating at Low Temperatures. Pt. 1.** A. Guilhaudis. *Revue de l'Aluminium*, no. 223, July-Aug. 1955, p. 717-725. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB39.)

Previously abstracted from original. See item 265-J, 1955.
(J-general, R2; Al)

344-J. (Dutch.) **Quenching Oils Removed by Rinsing.** K. H. Kopietz and J. G. van Overvest. *Metalen*, v. 13, Aug. 15, 1958, p. 273-279.

Film of special oils can be rinsed with water in which it forms an emulsion. Carbon steel C15 test pieces quenched in different water emulsive oils showed clean surfaces after rinsing. (J26, W28p, L12e; CN)

345-J. (Czech.) **New Data on the Structure of Carbonitride Layers.** Josef Cadek. *Hutnicke Listy*, v. 12, no. 7, 1957, p. 597-604.

When the layer contains more than 0.5% N, microscopic porosities are formed, caused by the liberation of N in the form of molecular, nondiffusing N_2 from the atomic N in the austenite. Separation of N in molecular form, in turn, is related to the local thermodynamic activity of N on the grain boundaries, an activity connected not only with the N content, but also with the carbon concentration. (J28m; ST)

346-J.* (Russian.) **Characteristics of Tempering After Induction Hardening.** I. N. Kidin, E. V. Astaf'eva and A. N. Marshalkin. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 2-12. (Henry Brutcher, Altadena, Calif., Translation no. 4348.)

Relationship between the procedure of high-frequency induction hardening and subsequent tempering; between the character of carbon distribution after hardening and its redistribution after tempering, which has a substantial effect on

mechanical properties of hardened and tempered steels. Tests conducted on steel 40KhN and 40KhG specimens hardened by continuous-successive method. After hardening, specimens were heated for 2 hr. at 200 to 650°. After heating to 500° specimens were tested on impact pendulum with 15 kg. power. Hardening with 1000° and tempering steel 40KhN results in same properties as in usual hardening and tempering. But hardening at 900°, with the same heating rate and tempering, results in maximum combination of properties—the impact rupture and hardness indexes are much higher. 16 ref.
(J29, J2g; ST)

347-J.* (Russian.) **Possibility of Raising Temperature of Solid Carburizer to 980°.** A. M. Tarasov and M. R. Semenchenko. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 39-42. (Henry Brutcher, Altadena, Calif., Translation no. 4356.)

Investigation to study possibilities of increasing temperatures to raise productivity of carburizing process. The cementation temperature during the experiments was raised to 980° using steels 20KHGR, 20KHNM, 20KH and 20. Under conditions of repeated heating after quenching it is possible to recommend cementation of parts in solid carburizers at 980°. The quality of carburized layers is improved. As a result of cementation at 980°, the productivity of the process is increased by 40-50% as compared to cementation at 910°; by 15% as compared to 950° cementation.
(J28g; ST)

348-J.* **Potential of Higher Temperature Carburizing.** *Metal Progress,* v. 74, Oct. 1958, p. 134-139.

Manufacturers are becoming interested in carburizing at higher temperatures to increase production. First moves by heat treaters will probably be to the 1800 to 1850° F. range which will give carburizing rates about 50% higher than at 1700° F. Even higher temperatures may be used in the near future for thick cases on tractor gears and other heavy-duty equipment.
(J28g, 1-66, W27; ST)

349-J. **Gas Carburizing and Case Hardenability.** T. W. Ruffle. *Metal Treatment,* v. 25, Oct. 1958, p. 397-403.

Test pieces were treated in a continuous, pusher-operated, three-track furnace, radiant tube heated in four zones, the atmosphere being endothermic gas made from air-propane with appropriate propane furnace addition. Steels investigated include SAE 4620 and SAE 8620. 6 ref.
(J28g; ST)

350-J.* (French.) **Changes in Surface Coloring of 18-Carat Gold Alloys.** G. Rey-Coquais. *Chimie et Industrie,* v. 80, July 1958, p. 11-12.

Yellowing or "greening" of Au alloys is due principally to action of air during successive anneals: Cu is converted into copper oxide, which can be dissolved by sulphuric acid. Various processes make it possible to avoid this color change or to regenerate the alloy at its surface. The latter are preferable, as surface color changes take place during all processes of fabrication of Au objects. (J23; Au-b)

351-J.* (German.) **Increasing Tensile Strength of Cogs by Hardening.** H. Rettig. *Industrieblatt,* v. 58, Oct. 1958, p. 435-442.

Steels and hardening methods best suited for each type. Advantages and disadvantages of common hardening procedures: carburizing, induction and flame hardening, nitriding. Results of tests on strength, torsion and wear resistance. 16 ref.
(J28, J2g, J2h, Q27a, Q1, Q9n; ST)

352-J.* (German.) **Steps Indicated to Control Distortion.** O. Liedholm. *Industrieblatt,* v. 58, Oct. 1958, p. HT77-HT79.

Different factors contributing to, or influencing distortion. Type of steel used; forging methods; intermediate treatment of material before machining; machining and resulting tensions in material; accuracy in working parts before heat treatment; carburizing; quenching method; shape of parts to be heat treated. Deals mostly with types of steel and an attempt is made to decide which steel is best suited for direct hardening.
(J-general, 9-74; ST)

353-J.* (German.) **Gas Carburizing.** Birger Lineberg. *Industrieblatt,* v. 58, Oct. 1958, p. HT79-HT80.

For parts subjected to great surface loads, in which distortion must be kept low and surface hardness at a constant high level, gas carburizing, using two liquids, proved adequate. Austenite and carbide in Cr-Ni steels can be kept within limits, while carbon content in surface layers does not exceed 0.8-0.95%. (J28g; ST, *Cr, Ni*)

354-J.* (Italian.) **Induction Hardening of Spheroidal Cast Iron.** V. Gottardi. *Fonderia Italiana,* v. 7, Sept. 1958, p. 331-334.

In cast iron having martensite matrix speed of graphitization is greater than with pearlitic matrix. Graphite precipitating at grain boundaries shows no tendency to migrate toward nodules but becomes stable and spheroidal at boundaries. This ferritic iron responds well to very brief thermal cycles (3 to 5 min.) such as employed in induction and flame hardening. Ferritic spheroidal iron parts can be induction hardened on surface without sacrificing malleability of interior. 6 ref. (J2g; CI-r)

355-J.* (German.) **Heat Treatment of Aluminum Bronze Castings.** Ernst Brunhuber. *Giesserei,* v. 45, Oct. 23, 1958, p. 667-670.

Investigations on Cu-Al-Fe and Cu-Al-Fe-Ni alloys. Heat treatment is performed in two steps: first by heating up to the range where the beta phase is steady with subsequent quenching to preserve this phase at room temperature, then by heating again and quenching, to improve mechanical properties. 5 ref. (J-general, 5-60; Cu-s, *Al, Fe, Ni*)

356-J.* (German.) **Hardening of Carbon Steel.** *Technica,* v. 7, Jan. 6, 1958, p. 716-718.

Structure of ferrite and several carbon steels with different percentage of carbon. Changes in the structure of carbon steel with different heat treating methods. Quenching baths. Incompletely hardened pieces must be annealed before rehardening. Iron-carbon diagram. Graphs of annealing and hardening temperatures of carbon steel. Micrographs of structure of different carbon steels. (J23, J26, M27; CN)

357-J. Heating and Cooling of Flat Strip. Pt. 1. A. H. Vaughan. *Industrial Heating,* v. 25, Oct. 1958, p. 1954-1963, 2180.

Graphs for computation of heating and cooling times in various capacity controlled-atmosphere and vacuum furnaces. 9 ref. (J-2; 4-53)

358-J. Property Changes in Steel Due to Low-Temperature Quenching. Pt. 5. Age-Hardening Capacity and Fatigue Strength. Tadakazu Sakurai and Tadashi Kawasaki. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 532-538.

18 ref. (J27d, Q7a; ST)

359-J. Heat Treating Large Aluminum Extrusions. *Light Metal Age,* v. 16, Oct. 1958, p. 14-15.

Extremely large and long sections of 7075 and 7178 Al heat treated and quenched in short time without distortion.
(J26, W27g; Al-b, 4-58)

360-J. Furnace Slashes Annealing Costs in Half. *Steel,* v. 143, Nov. 3, 1958, p. 70-71.

Continuous operation through annealing and relubrication of deep-drawn parts has eliminated pickling and reduced material handling.
(J23, G4b, 18-74, 17-53; ST)

361-J. Effect of Working Conditions on Mechanical Properties, When Patenting Rope Wires After Electric Resistance Heating. W. Lueg and K. Schemmer. *Wire Industry,* v. 25, Oct. 1958, p. 939-941. (From *Stahl und Eisen,* July 10, 1958.)

Previously abstracted from original. See item 285-J, 1958.
(J25, Q-general, 3-68; ST, 4-61)

362-J. Measurement of Carburizing Efficiency of Salt Baths. O. Schaaber and R. Fischer. *Härterei-Technik und Wärmebehandlung,* v. 2, no. 10, 1956, p. 89-90, 92-96. (Henry Brutcher, Altadena, Calif., Translation no. 4308.)

Determination of carbon potential over a 60-day period, at 900° C. of an activated three-salt bath with constant potassium cyanide content.
(J2j)

363-J. Heat Treatment of Aluminum-Zinc-Magnesium-Copper Alloys. M. Tournaire and G. M. Renouard. *Metaux Corrosion Industries,* v. 22, Mar. 1957, p. 95-101. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1276.)

Previously abstracted from original. See item 104-J, 1957.
(J-general, Q21b, Q23; Al, *Zn, Mn, Cu*)

364-J. Design, Mode of Operation and Operational Results of a Modern Wide Strip Annealing Plant. V. Seul and J. Billigmann. *Stahl und Eisen,* v. 77, Mar. 21, 1957, p. 309-323. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 93-J, 1957.
(J23, W27, 1-61; ST, 4-53)

365-J. Influence of Heat Treatment in a Magnetic Field on the Structure and Mechanical Properties of Steel. H. Jahn. *Stahl und Eisen*, v. 78, Feb. 6, 1958, p. 178-180. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1262.)

(J-general; Q-general; ST)

366-J. (German.) **Distortion in Hardening of Tools.** M. Winkel. *Industrieblatt*, v. 58, Oct. 1958, p. HT82-HT86.

(J-general, T6; ST, 9-74)

367-J. (German.) **Electric Heat-Current Model for Practical Induction Heating.** Herbert Geisel and Lothar Liebing. *Industrieblatt*, v. 58, Oct. 1958, p. 446-449.

To solve problems in induction heating, a simple model was built for practical tests. A number of questions answered and evaluated graphically. (J2g)

368-J. Precipitation Hardening Employing Magnetic Measurement. J. D. Livingston and J. J. Becker. *Metallurgical Society of AIME, Transactions*, v. 212, June 1958, p. 316-320.

Precipitate particle size, mechanical properties and magnetic properties of Cu-Co alloy. 9 ref.
(J27, Q-general, P16, 3-68; Cu-b, *Co*)

369-J. Annealing Texture in a Rolled and Artificially Nucleated Aluminum Crystal. S. Kohara, M. N. Parthasarathi and P. A. Beck. *Metallugical Society of AIME, Transactions*, v. 212, Dec. 1958, p. 875-881.

Recrystallized grains due to annealing at 350° C. Anisotropy of boundary mobility and orientation. 21 ref. (J23c, M26c; Al, 14-61)

370-J. Postheat Treating Weldments With an Exothermic Material. M. F. Sheely and B. L. Lacey. *Welding Journal*, v. 37, Dec. 1958, p. 554s-557s.

5% Cr, 0.5% Mo wrought-pipe weldments can be post heat treated successfully.
(J2, K9q; AY, *Cr, Mo*, 4-60)

SECTION K

JOINING

1-K. Diffusion Bonding of Zircaloy to Stainless Steel Tubing. K. M. Gerken. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-JMG-10, May 29, 1957, 14 p. (CMA)

Diffusion bonded joints did not fail after thermal cycling 200 times in the 100-600° F. range or after pressure cycling 100 times in the 100-3900 psi. range. Hydraulic bursting pressures to 13,200-17,200 psi. were needed to cause failure in well-bonded joints. The tapered butt joint design is recommended.
(K5k; Zr, SS, 4-60)

2-K. Welding of Titanium and Titanium Alloys Containing Boron. Final Report. J. M. Gerkin. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-JMG-1, July 17, 1956, 7 p. (CMA)

For all of the Ti-B and Ti-Al-V-B alloys studied the hardness of the heat affected and weld zones was greater than that of the unwelded plate, while the ductility of the weld zones could be restored to its former level. The Ti-Al-V-B alloys have more ductility and much more strength than the Ti-B alloys for comparable contents of boron. 3 ref.
(K general, Q27a, Q29n, 2-60; Ti, *B*)

3-K. Joining of Molybdenum. W. N. Platte. Wright Air Development Center, Technical Report 54-17. *U. S. Office of Technical Services,* PB 128527, Aug. 1954, 108 p. (CMA)

Welds in deoxidized arc-cast molybdenum are subject to hot short cracking when the oxygen content of the argon atmosphere around the arc exceeds 0.2%, and the ductility of the welds is reduced drastically by the presence of more than 0.05% oxygen. Oxygen in sintered molybdenum produces porosity and hot short cracking, but good welds have been obtained by using deoxidizing agents. (K1d; Mo, 9-72)

4-K. Welding of Type 347 Steels. Arthur Hoerl and Thomas J. Moore. *Welding Journal,* v. 36, Oct. 1957, p. 442s-448s.

Statistical analysis of effects of various elements on crack sensitivity of fully austenitic Type-347 welds. 12 ref. (K9r, 2-60, 9-72; SS)

5-K. Mechanism of Microcracking in Mild-Steel Welding. K. Winterton. *Welding Journal,* v. 36, Oct. 1957, p. 449s-456s.

Theory in terms of the accumulation of hydrogen under pressure in pre-existent flaws, specifically incipient hot cracks and misfits at the boundaries of nonmetallic inclusions. 19 ref. (K9, Ni; CN, 9-72)

6-K. High-Temperature Brazing of Aluminum Bronze to Inconel. Donald Caplan and Ernest F. Nippes. *Welding Journal,* v. 36, Oct. 1957, p. 457s-464s.

Brazing aluminum bronze without flux; and alternately brazing with suitable fluxes based on mixed chlorides soluble enough to be readily removed. 29 ref.
(K8, 2-62; Cu-s, *Al,* Ni)

7-K. Thermal Analysis of Brazing and Hard-Surfacing Alloys—a Proposed Method. Forbes M. Miller. *Welding Journal,* v. 36, Oct. 1957, p. 986-991.

Simple, practical and accurate means for determining liquidus and solidus temperatures for brazing and hard surfacing alloys which melt within the range of 1600 to 2100° F. (K9; SGA-f)

8-K. Zinc Soldering of Aluminum. I. B. Robinson. *Welding Journal,* v. 36, Oct. 1957, p. 992-997.

Zinc soldering with the proper fluxes, solder and procedures provides simple method for joining aluminum to itself and dissimilar metals at intermediate temperatures to provide strong, easy-to-make, corrosion resistant joints. 4 ref.
(K7; Al)

9-K. (German.) **Modern Welding.** A. Hohmann. *Giesserei-Praxis,* v. 75, Sept. 30, 1957, p. 409-413.

Hot, cold and low heat processes; welding methods for gray cast iron, cast steel and malleable cast iron. Advantages of cast-weld construction. (K general; ST, CI)

10-K. (German.) **Safety of Welded Construction.** A. Slattenschek. *Schweisstechnik,* v. 11, Aug. 1957, p. 85-93.

Calculation of stress-strain; laboratory testing; unsafe conditions in welded construction; safety measures. 21 ref.
(K general, A7; ST, SGB-s)

11-K. Report on Strength of Welded Joints in Carbon Steel at Elevated Temperatures. Special Task Group of the Petroleum and Chemical Panel of Joint ASTM-ASME Research Committee. *ASME Transactions,* Paper no. 57-PET-1, 1957, p. 1-12.

Evaluation of strength of composite specimens including weld, heat affected metal and base metal, exclusive of any effects of mechanical notches, reinforcement, flaws, undercuts, etc. Material tested was silicon-killed carbon-steel plate.
(K9r, 2-62; CN, 4-53)

12-K. Problems of Arc Welding Heavy Steel Objects. A. Lüthy and A. Schmid. *Brown Boveri Review,* v. 44, June-July 1957, p. 260-270.

Edge preparation, welding technique, electrode selection, post-welding heat treatment, testing of seams.
(K1, K9q, K9r; ST)

13-K. Function of Fluxes in Automatic Arc Welding. A. L. Saboz and C. G. Telschow. *Brown Boveri Review,* v. 44, June-July 1957, p. 286-290.

Drawbacks encountered when welding with bare wire electrodes; function of welding fluxes used for automatic arc welding; differences between premelted and agglomerated fluxes; effect of fluxes on the welding process. (K1; RM-q)

14-K. Microcracking in Mild Steel Weld Metal. Pt. 1. K. Winterton. *Canadian Metalworking,* v. 20, Sept. 1957, p. 34-42.

Relationship between cooling rate, plate temperature, hydrogen content, hydrogen diffusion rate, nonmetallic inclusions and microcracking with 15 common electrodes. (To be concluded.)
(K9, W29h, 1-52; CN, 9-72)

15-K. Joining Mild Steel? How to Select the Right Electrode. C. Cambell. *Canadian Metalworking,* v. 20, Sept. 1957, p. 48-54.

Classification of joints and selection of electrodes.
(K1, W29h, 1-52; CN)

16-K. Process That Speeds a Quality Weld. *Design Engineering,* v. 3, Oct. 1957, p. 59-61.

Advantages, limitations, recommended conditions for use of "Aircomatic" process in welding mild steel; examples of use. (K1d; CN)

17-K. Driving Titanium Rivets. T. A. Dickinson. *Modern Machine Shop,* v. 30, Nov. 1957, p. 128-129. (CMA)
(K13n; Ti)

18-K. Welding High-Tensile Steels. K. L. Zeyen and H. Schwarz. *Welding Journal,* v. 36, Nov. 1957, p. 480s-482s.

Digest of article published in *Technische Rundschau* (Bern, Switzerland) no. 1/2, Jan. 11, 1957.
(K1; ST, SGB-a)

19-K. Butt Welding Austenitic Stainless Steel to Ferritic Steel in Cylindrical Shapes. J. E. Donahue. *Welding Journal,* v. 36, Nov. 1957, p. 1074-1077.

Used in turbine-generator units. 6 ref. (K1; SS-d, SS-e)

20-K. (Czech.) **Weldability at High Temperatures of Austenitic Nickel-Chromium Steel Stabilized With Columbium.** Josef Nemec. *Hutnické Listy,* v. 12, Sept. 1957, p. 788-794.

Weld failures with thick-walled elements attributed to the influence of heat on material adjacent to the weld. Brittle sigma phase and segregations on the boundaries of austenitic grains have unfavorable influences. 13 ref.
(K9s; SS, *Cb, Ni, Cr*)

21-K. (German.) **Strength of Bonded Metal Joints.** H. Winter and G. Krause. *Aluminium,* v. 33, Oct. 1957, p. 669-680.

61 ref. (K12)

22-K. (German.) **Reverse Twist in the Production of Wire Cables.** Josef

Regensburger. *Draht,* v. 8, Aug. 1957, p. 285-289.

To avoid unbalance of stresses on individual wires in a cable, a reverse motion of the individual wire is required in relation to the stranding motion. Variable crank mechanisms, planetary gears or Leonard drives are used to generate this motion. (K13a)

23-K. (German.) **Weaving of Heavy Wire Cloth.** A. Jasper. *Draht,* v. 8, Aug. 1957, p. 296-298.

Woof wires must be crimped when the longitudinal force along the warp wire is higher than the maximum force exerted by the weaving frame of the loom. Computations for determining the forces. (K13s; 4-61)

24-K. (German.) **Structural Defects of Austenitic Welds on Ferritic Steels Subjected to Elevated Temperatures.** Friedrich Erdmann-Jesnitzer, Manfred Beckert and Heinz Schmiedel. *Schweissen und Schneiden,* v. 9, Sept. 1957, p. 407-414.

Welding of ferritic steels with austenitic electrodes leads to the formation of a decarburized alpha iron zone close to the weld. This is particularly susceptible to stress-corrosion cracking. Formation of alpha-iron zone of the columnar grain type can be suppressed by suitable carbide-forming additions. Testing apparatus to determine the relation between depth of decarburization and time until fracture. 50 ref. (K1, K9n; ST, 9-72)

25-K. (German.) **Metallurgical Aspects of Welding Heat Resistant 12% Cr + Mo-V-W Alloy Steels.** E. Kauhausen and P. Kaesmacher. *Schweissen und Schneiden,* v. 9, Sept. 1957, p. 414-419.

In the temperature range around 580° C., 12% Cr steel is satisfactory for high-pressure tubes and turbines. Welding can be done under carefully selected conditions. Recommendations for welding procedures with seven different coated electrodes. (K1; SS, SGA-h)

26-K. (German.) **Problems of the Technique of Welding.** Erich Sudasch. *Werkstatt und Betrieb,* v. 90, Oct. 1957, p. 745-753.

Review of papers given at German Welding Engineering Society meeting. (K general)

27-K. (Japanese.) **Consumption of Aluminum, Iron and Copper Welding Electrodes in Air, Argon and Carbon Dioxide.** M. Ozawa, T. Morita and K. Omura. *Electrochemical Laboratory, Bulletin (Denki Shikenja Iho),* v. 21, July 1957, p. 512-517.

Effects of oxygen and oxides; effect of iron oxides on steel; effect of copper oxide on copper; effect of alumina on aluminum. (K1, W29h; ST, Cu, Al)

28-K. (Russian.) **Mechanics of the Development of Hot Cracks in Weld Joints.** V. A. Toropov. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 54-58. (Also *Henry Brutcher Translation* No. 3982.)

Theoretical consideration of intercrystalline relationships. 13 ref. (K9n, 9-72)

29-K. (Russian.) **Electroslag Welding Using Magneto-Propelled Apparatus.** M. M. Fikshis. *Stanki i Instrument,* v. 28, Aug. 1957, p. 29-32.

Apparatus suitable for welding of angle joints of any design. Use of one apparatus on each side of the welded part simultaneously is recommended. 9 ref. (K1e, 1-52)

30-K. **Squirt Gun Welds Dissimilar Metals.** A. R. Kemerer. *American Machinist,* v. 101, Oct. 21, 1957, p. 146-147.

Heavy sections of T-1 steel and 405 stainless welded by semi-automatic submerged arc with 18-8 stainless steel wire and Cr-enriched flux. (K1e; ST, SS)

31-K.* **Welding of Uranium.** J. R. C. Gough and D. Roberts. *British Welding Journal,* v. 4, Sept. 1957, p. 393-403.

Investigation to assess adaptability of argon arc, metal arc and resistance spot welding processes to joining of U. Chemical and physical properties of U and their effect on welding. 18 ref. (K1, K3n; U)

32-K. **Welding of Heat-Exchanger Elements in a Fast Breeder Reactor.** S. H. Griffiths. *British Welding Journal,* v. 4, Sept. 1957, p. 403-411.

Argon arc welding process and radiographic and other inspection methods used in fabrication of heat exchangers from 18-8-1 stainless steel. (K1d, W13b, S13k)

33-K.* **Weldability of ND Steels.** L. Reeve. *British Welding Journal,* v. 4, Sept. 1957, p. 425-432.

Battelle and Reeve underbead cracking tests for weldability carried out on series of C-Mn steels including a number of notch ductile types. Results more in accord-

ance with British carbon equivalent formula than Battelle formula for weldability. 7 ref. (K9s; AY)

34-K.* Shielded Inert-Gas Metal-Arc Welding With Particular Reference to Welding Costs. D. B. Tait. *British Welding Journal,* v. 4, Nov. 1957, p. 501-511.

Application of "sigma" process to Al alloys, stainless steel and mild steel. (K1d; Al, SS, CN)

35-K. Induction Brazing. W. E. Benninghoff. *Industry and Welding,* v. 30, Sept. 1957, p. 36-38, 64-67.

Principles and advantages of induction brazing, joint design, heating and alloy selection. (K8k)

36-K. It's Not So Tough to Weld Copper and Steel. *Industry and Welding,* v. 30, Sept. 1957, p. 53, 77.

Carbon-arc and phosphor-bronze welding rods used for welding mild steel legs to copper vessels. (K1h; Cu, ST)

37-K. No Threads, No Welds, Just Glue. Jack Schwartz. *Metalworking Production,* v. 101, Nov. 8, 1957, p. 2006-2007.

Epoxy resin ensures high joint strength in armor-piercing shot. (K12; NMd34; AY)

38-K. Copper Brazing. Thomas W. Ferguson, Jr. *Metal Treating,* v. 8, Sept-Oct. 1957, p. 6-7, 40, 44, 55.

The process, its advantages, preparation, assembling, applying brazed material, controlling Cu flow, atmosphere for furnace brazing, strength of joints and heat treatment of Cu brazed steel assemblies. (K8; ST, Cu)

39-K.* New CO_2 Welding Process. A. F. Chouinard and R. P. Monroe. *Welding Journal,* v. 36, Nov. 1957, p. 1069-1073.

Uses a bare flux-cored electrode and gives a high deposition rate, a visible arc and sound weld metal; suitable for welding low to medium-carbon steels and certain alloy steels. (K1d; ST)

40-K.* Bonded Fluxes for Submerged-Arc Welding of Alloy Steels. Hallock C. Campbell and Wallace C. Johnson. *Welding Journal,* v. 36, Nov. 1957, p. 1078-1084.

New type flux permits controlled variation of weld chemistry through incorporation in the flux of alloying elements, deoxidizers and strong fluxing agents, duplicating for submerged arc welding the whole range of formulation used by the covered-electrode manufactures. (K1e; SS, RM-q)

41-K.* Experimental Welding With the Cone Arc. R. E. Monroe and D. C. Martin. *Welding Journal,* v. 36, Dec. 1957, p. 518s-520s.

Electrical characteristics of the cone-arc welding process studied during development of welded Mo heat exchangers containing tube-to-header joints. Tests showed that the production of uniform welds was primarily a function of even heat transfer around the weld periphery. High-speed motion-picture studies of the arc failed to substantiate the basic cone-arc theory of a rotating ion beam. A modified theory is presented to explain the cone-arc process. 4 ref. (K1; Mo)

42-K.* Selection of Welding-Rod Chemical Composition Through Mathematics. G. H. Bohn. *Welding Journal,* v. 36, Dec. 1957, p. 541s-549s.

Procedure for determining the most satisfactory chemical composition for Cu-Si-Mn-Fe alloy welding rod. A mathematical formula was developed to determine the minimum resultant tensile strength of the weld as a function of the Si, Mn and Fe contents. The desired fluidity of the weld pool, to eliminate weld cracking, was obtained by maintaining the ratio of Si to Mn to an experimentally determined minimum. 6 ref. (K1, W29h, 2-60)

43-K.* Heat-Exchanger Fabrication. P. Patriarca, G. M. Slaughter and W. D. Manly. *Welding Journal,* v. 36, Dec. 1957, p. 1172-1178.

Tube-to-tube sheet welding and brazing procedures which have been incorporated into the fabrication of Ni-alloy heat exchangers for elevated-temperature service. Vessel portions of these units are assembled entirely by inert-arc welding procedures. (K1d, W13b; Ni)

44-K. A Satisfactory Base-Quality Steel for Both Riveted and Welded Structures. J. O. Jackson. *Welding Journal,* v. 36, Dec. 1957, p. 1184-1194.

Argues that specification ASTM A7 be revised to indicate that it is suitable for use in either riveted or welded structures, allowing the specified 60,000-psi. minimum tensile strength to remain, but adding a carbon limitation of 0.30% on ladle analysis up to a maximum permissible thickness for welded structures of 2 in. (K1, 15-68; ST)

45-K. Fluid-Cooled Honeycomb: Special Furnaces, Core Machinery Fabricate Brazed. *Western Metals,* v. 15, Nov. 1957, p. 50-51.

(K8j, W29m; 7-59)

46-K.* (Pamphlet.) **Brazing of Aluminum and Its Alloys. 1957.** 36 p. Aluminum Development Association, 33 Grosvenor Street, London, W.1, England. 2 sh.

Three main methods are flame, furnace and flux dip brazing. Suitable Al materials, fluxes, joint design, cleaning methods, fluxing and brazing procedures. (K8; Al)

47-K. (French.) **Cold Pressure Welding.** Robert Sathicq. *Revue de l'Aluminium,* no. 246, Sept. 1957, p. 875-880.

Metallic parts are welded by a pressure exceeding the creep limit at room temperature after mechanical brushing. Any light metal can be welded with Al, and the process is very cheap. (K5; Al)

48-K. (French.) **Importance of Weldability of Aluminum Alloys in Ship Construction.** H. E. Jaeger. *Revue de la Soudure,* v. 13, 1957, p. 151-162.

Corrosion of Al alloys by salt water; the most corrosion resistant are Al-Mg; their weldability is very good. Comparison of riveting and welding; difficulties in the welding of light alloys. Distribution of steel and Al alloys in the construction of a ship according to the mechanical properties required. 13 ref. (K9s, R4b, T22g; 17-57; Al)

49-K. (French.) **Welding of "Schlieren" Bogies.** *Revue de la Soudure,* v. 13, 1957, p. 163-171.

(K2h, T23p)

50-K.* (French.) **Contribution to the Study of the Influence of Hydrogen on the Strength of Deposited Metal in Arc Welding With Coated Electrodes.** M. Moneyron and D. Seferian. *Soudage et Techniques Connexes,* v. 11, Sept-Oct. 1957, p. 277-289.

Tests showed that loss of diffusible hydrogen at room temperature from an arc weld causes appreciable variation in weld strength. This variation can be partially or completely corrected by the presence of nitrogen imparted by electrodes containing this gas. Results obtained with basic, rutile, acid, oxidizing and cellulose electrodes. 12 ref. (K1, Q27a, W29h, 1-52; ST, *H*)

51-K. (French.) **A Visit to Four Brissoneau and Lotz Plants.** *Soudage et Techniques Connexes,* v. 11, Sept-Oct. 1957, p. 290-294.

Welding processes and equipment used in fabrication of railway, aeronautic and water transport material in shops where product quality and economy are emphasized. (K general, 1-52, T23, T22, T24)

52-K.* (French.) **Arc and Flame Butt Welding of Ferritic Steel Boiler Tubes.** J. Hennion. *Soudage et Techniques Connexes,* v. 11, Sept-Oct. 1957, p. 323-332.

Comparison of characteristics of arc and flame welds made on tubes up to 90 mm. diameter and 9 mm. wall in Cr-Mo steel. Influence of preheating and heat treatments. Methods of heating and of inspection of welds. (K1, K2, K9p; ST, 4-60)

53-K. (German.) **Contribution to Welding of Titanium.** Helmut Van Kann. *Schweissen und Schneiden,* v. 9, Oct. 1957, p. 460-464. (CMA)

Neither tensile nor impact strength of Ti sheet in the neighborhood of the weld is impaired if the welding operation is conducted with the required care, the ductility on the other hand is lessened. 4 ref. (K general; Ti)

54-K. (Norwegian.) **Brazing of Aluminum Cables.** *Teknisk Ukeblad,* v. 104, Aug. 8, 1957. (In the Appendix *Naco-nytt,* v. 11, no. 45, p. 1-3.)

(K8, T1b; Al)

55-K.* New Semiconductor Bonding Technique. *Electronics Technician,* v. 66, Sept. 1957, p. 71.

Thermo-compression bonding, developed at Bell Telephone Labs, utilizes heat and pressure to provide firm bond between various soft metals and clean, single crystal semiconductor surfaces. (K6, T1k)

56-K.* Metal-Arc Welding of Mild Steel Plates. Avoiding Difficulties. R. S. Bolton. *Iron and Coal Trades Review,* v. 175, Sept. 6, 1957, p. 557-562.

Materials, electrodes, welding procedure and inspection of welds. (K1; CN, 4-53)

57-K. Designing Low Cost Weldments. John Mikulak. *Machine Design,* v. 29, Sept. 19, 1957, p. 135-140.

(K general, 17-51)

58-K. Joining of Zircaloy-2 to Austenitic Stainless Steel. Report No. 1. K. H. Koopman and O. F. Kim-

ball. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-KOK-1, July 31, 1956, 30 p. (CMA)

Welding, brazing and cladding were studied in an attempt to join Zircaloy-2 to stainless steel. The formation of brittle intermetallic compounds with Zr is the main difficulty. 3 ref. (K1, K8, L22; Zr, SS)

59-K. Fabrication of a Titanium Tube Heat Exchanger. R. W. Wirta. Hanford Works. *U. S. Atomic Energy Commission,* HW-51998, Aug. 20, 1957, 31 p. (CMA)

Gas embrittlement caused a prototype Ti tube heat exchanger to crack at the weld. Micrography revealed gross oxygen contamination of the weld metal. In making a second heat exchanger, a glove box welding method was used successfully to weld Ti tubes to the Ti sheet facings. (K1, W13b; Ti)

60-K. (French.) **Recent Improvements in the Technique of Welding and Gas Cutting.** J. Boussard. *La Pratique des Industries Mecaniques,* v. 40, Sept. 1957, p. 233-241.

Arc welding, inert arc welding, resistance welding and supersonic welding. (K1, K3, K6)

61-K. (German.) **Induction Soldering.** Erich Kolbe. *Deutsche Elektrotechnik,* v. 11, Aug. 1957, p. 371-372.

(K7e)

62-K. (German.) **Resistance of Sheet Metal Welds to Strain Aging.** Siegfried Förster, Werner Rauterkus, Herbert Thielmann and Fritz Thyssen. *Schweissen und Schneiden,* v. 9, Oct. 1957, p. 447-457.

Characteristics of various welding processes; selection of electrodes.
(K general, N7e; 4-53; CN, ST, *Mn*)

63-K.* (German.) **Metallurgical Importance of the Arc in Machine Welding.** W. Mantel and L. Wolff. *Schweissen und Schneiden,* v. 9, Oct. 1957, p. 457-460.

Melting and penetration with regard to welding at the positive and negative electrodes; auxiliary agents for welding with base electrodes by alternating current arc; effect of the arc on the melting pool and the parent metal; control mechanisms. (K1g, K9n, W29)

64-K. (German.) **Problems of Welding Structural Steels of High Tensile Strength.** H. J. Wiester. *Schweissen und Schneiden,* v. 9, Oct. 1957, p. 465-468.

Nitrogen content; weldability of basic bessemer steels; aging cordition. 18 ref.
(K9s; 2-65, 3-68; ST-g, SGB-s)

65-K. (German.) **Contractions, Contraction Tensions and Tolerances in Welded Construction.** Hans J. Machill. *VDI Zeitschrift,* v. 99, Aug. 1957, p. 1189-1190.

(K general, 17-51)

66-K. (German.) **Welding and Cutting.** Alexander Matting. *VDI Zeitscrift,* v. 99, Aug. 1957, p. 1199-1202.

Literature survey. 75 ref.
(K general, G22g)

67-K. (Italian.) **Inert-Gas Consumable-Electrode Arc Welding of Aluminum.** Giuseppe Foti. *Rivista Italiana della Saldatura,* v. 9, July-Aug. 1957, p. 153-162.

Description of technique, its advantages and drawbacks; applications in Italy in construction of ships and pressure vessels, and in cold rolling mills for joining Al strip. (K1d; Al)

68-K. (Spanish.) **Factors in Productivity of Welding.** Othmar Schmidt. *Ciencia y Tecnica de la Soldadura,* v. 7, Sept-Oct. 1957, 7 p.

Factors influencing productivity of manual electric arc welding in plant where specialty is not welded construction but certain types of machinery. Knowledge of steels, electrodes, welding apparatus, preparation of work, design, tools, contraction phenomena. (K1; ST)

69-K. (Spanish.) **Assembly of Motorcycle Frames: Several Solutions to This Problem.** Ernest Demaret. *Ciencia y Tecnica de la Soldadura,* Sept-Oct. 1957, 9 p.

Welding techniques applicable to manufacture of two-wheel vehicles and specific uses of each. 12 ref. (K general, T10h; ST)

70-K. (Spanish.) **Influence of Welding on Metal Structures.** C. Penche Felgueroso. *Ciencia y Tecnica de la Soldadura,* v. 7, Sept-Oct. 1957, 12 p.

Advantages of metal structures over concrete, and of welded joints over other types. Three types of structures, isostatic, rigid and semi-rigid, considered, from point of view of stress and load factors, as well as design factors, convenience of execution of joints, etc.; examples. (K general, T26)

71-K. Science and Technique of Welding in the Soviet Union. N. N.

Rykalin. *British Welding Journal,* v. 4, Dec. 1957, p. 541-547.

Submerged-arc welding is most commonly used, and a wide variety of equipment has been developed. Electro-slag process for the single-pass welding of thick plates or slabs. Widespread use of alternating current for welding in the U.S.S.R. 7 ref. (K general)

72-K.* Projection Welding of 24 S.W.G. Mild Steel. J. E. Roberts and G. A. Phipps. *British Welding Journal,* v. 4, Dec. 1957, p. 557-563.

Experimental technique used to determine optimum welding conditions for single, double and triple projection welds. Selection of the welding conditions has been made by the examination of mean strength, consistency and surface appearance. 4 ref. (K3q; CN)

73-K. (Italian.) A Case of Improper Welding. Eugenio Hugony. *Ingegneria Meccanica,* v. 6, Sept. 1957, p. 7-8.

Analysis of fragment of turbine blade in 18-8 stainless showed that defective casting has been repaired with inferior materials and improper welding procedures, resulting in fracture of part during service. (K general, 18-72; SS, 5-60)

74-K. (Russian.) Dispersion of Carbon in the Vicinity of Welded Joints of Austenitic Steel Type 18-9. N. V. Ulyanova and V. V. Sagalovich. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 2-7.

The carbon was traced by radioactive isotopes. Images produced by auto-radiography proved to be satisfactory for evaluating the macroscopic character of carbon dispersion in the welded joint and in the adjoining areas in this Cr-Ni Steel. 4 ref. (K9r, 1-59; SS)

75-K. Stainless Steels: Problem or Opportunity? H. J. Nichols. *Canadian Metalworking,* v. 20, Oct. 1957, p. 50-52.

Classes of stainless steels and difficulties encountered in welding. (K general; SS)

76-K. Microcracking in Mild Steel Weld Metal. Pt. 2. *Canadian Metalworking,* v. 20, Oct. 1957, p. 58-64.

Relationship between electrode type, hydrogen content, hardness and microcracking density. Association of microcracking with different types of nonmetallic inclusions and hydrogen accumulation in flaws. 19 ref. (K1, 9-72; CN)

77-K.* Dip Brazing Magnesium. William J. Graves. *Light Metal Age,* v. 15, Dec. 1957, p. 23.

Two parent material alloys of magnesium have been successfully brazed, M1A alloy and AZ31B (FSI) alloy. The most satisfactory brazing filler alloy to date is AB125. Dow brazing flux #452 has given the best results with this filler alloy. (K8n; Mg, SGA-f)

78-K. Welding the Lincoln Uniframe Body. M. H. Trygar and O. B. Simmons. *Machinery,* v. 64, Dec. 1957, p. 162-165.

Spot welding process. (K3n)

79-K.* Joining of Metals. *Metal Industry,* v. 91, Dec. 13, 1957, p. 495-497.

Resumé of four papers on wetting and spreading of liquid metals on solid metal surfaces which were presented recently at a conference at University of Birmingham, England. (K9n)

80-K. Automatic Multi-Stage Projection Welding Line. E. C. Hall. *Metalworking Production,* v. 101, Nov. 1, 1957, p. 1951-1955.

Automatic feeding systems for multiple resistant welding stations. (K3q, 1-52, 18-74)

81-K. Challenge to the Rubber Industry. Ralph Schmuckal. *Rubber Age,* v. 82, Dec. 1957, p. 478-480.

Problems involved in bonding of rubber to metal and subsequent serviceability of metal-rubber parts. (K11c)

82-K. Trends in Metal Preparation. F. W. Gage. *Rubber Age,* v. 82, Dec. 1957, p. 480-481.

Pretreatment of metal surfaces preparatory to bonding of rubber coatings. (K11c, L10c, L12n)

83-K. Trends in Rubber-to-Metal Bonding. Howard L. Irvin. *Rubber Age,* v. 82, Dec. 1957, p. 481-482.

Present types and future requirements of adhesives and elastomers, with special reference to bonded assemblies intended for high-service temperatures. (K11c; NM-d36)

84-K. Application of Ultrasonic Energy to Cold Welding of Metals. J. B. Jones and C. F. DePrisco. Aeroprojects Inc. (Frankford Arsenal.) *U. S. Office of Technical Services,* PB 131083, Nov. 1953, 61 p. $1.75.

(K6, 1-74; EG-a38)

85-K. Ultrasonic Welding of Metals. J. B. Jones, C. F. DePrisco and J. G. Thomas. Aeroprojects Inc. (Frank-

ford Arsenal.) *U. S. Office of Technical Services,* PB 131084, Apr. 1955, 105 p. $2.75.

(K6, 1-74)

86-K. Evaluation of Welded Joints Between AISI 347 Stainless Steel and 70-30 Copper-Nickel Alloy Tubes Under Thermal Shock Specimen No. 3. W. E. Clautice and R. W. Stevens. U. S. Naval Engineering Experiment Station. *U. S. Office of Technical Services.* PB 121877, May 1955, 49 p. $1.25.

Evaluation of emergency heat exchangers in a new type of submarine propulsion plant.
(K9r, Q10a, W13b; SS, Cu, Ni)

87-K. Strength and Corrosion Resistance of Ultrasonically Soldered Aluminum Joints. J. B. Jones and J. G. Thomas. Aeroprojects Inc. (Frankford Arsenal.) *U. S. Office of Technical Services,* PB 121965, Mar. 1956, 61 p. $1.75.

(K7h, Q27a, R general: Al, Sn, Cd)

88-K.* Study of Metallurgical Effects in the Multipass Welding of Zircaloy. *Welding Journal,* v. 37, Jan. 1958, p. 1s-9s.

Tests on a 32-pass weldment indicate that 100% joint efficiency was achieved with very slight loss of ductility through proper control of interpass temperature. The corrosion behavior of the weldment is equivalent to, or better than, that of the base metal. 12 ref.
(K9n, R general; Zr)

89-K. Development of Welding for Engineering Fabrication. J. H. Humberstone. *Welding Journal,* v. 37, Jan. 1958, p. 9-15.

History, applications and recent developments. (K general, A2, 17-57)

90-K. New Techniques in Precision-Welding Control. J. L. Solomon and M. Balikov. *Welding Journal,* v. 37, Jan. 1958, p. 16-21.

Control of function duration by counting cycles rather than timing by the use of resistance-capacity circuits. (K3)

91-K.* Effect of Preheating and Postheating on Toughness of Weld Metal. T. N. Armstrong and W. L. Warner. *Welding Journal,* v. 37, Jan. 1958, p. 27s-29s.

Postheating weld metal from seven classes of steel electrodes at 1150° F. in no instance lowered the transition temperature. Preheating at temperatures up to 600° F. improved the impact properties of E7015 carbon steel weld metal and E8015-C2 nickel steel weld metal. In no instance did preheating adversely affect the impact properties of welds from these two electrodes.
(K9p, K9q, Q6n; ST)

92-K.* Dip Brazing Aluminum With Paste Filler. A. M. Setapen. *Welding Engineer,* v. 43, Jan. 1958, p. 30-32.

New filler metal is a eutectic consisting of 88% Al and 12% Si (AWS designation BAlSi-4), and melts between 1070-1080° F. Supplied as a powder in combination with a controlled amount of a flux-cement, it is made up into an aqueous paste, coated directly onto the joint area.
(K8n; SGA-f, Al)

93-K.* Application Aids for Arc Welding Aluminum Bus. *Welding Engineer,* v. 43, Jan. 1958, p. 34-37.

Recommended practices for metal-arc welding with flux-coated electrodes; recommended practices for Tig welding aluminum; typical properties of Tig and Mig welds in aluminum bus conductor.
(K1e, T1c; Al)

94-K. Filler Metals for Joining. Orville T. Barnett. *Welding Engineer,* v. 43, Jan. 1958, p. 56-62.

Classifications, specifications, applications and properties.
(K1, S22; SGA-f)

95-K. Primary Structure and Causes of Weld Hot Cracking of Chromansil-Type Steel. S. V. Avakyan and N. F. Lashko. *Avtogennoe Delo,* v. 21, no. 10, 1950, p. 13-16. (Henry Brutcher Translation no. 3983, Altadena, Calif.)

Previously abstracted from original. See item 111-K, 1951.
(K1, M21, AY)

96-K. (Dutch.) **Silver Soldered Heating Coils in Crude Oil Tankers.** H. R. Brooker. *Lastechniek,* v. 23, Oct. 1957, p. 236-239.

For a long time fusion welded steel pipes were used as heating coils, but because of severe corrosion, the life-span was short. Aluminum-bronze pipe (76-22-2), although much higher in price, means a considerable saving to the ship owner. Silver soldering was chosen as the best joining method. Advantages include reliable joints between different metals, ability to join special Cu alloys with a strength equal to that of the parent metal, working speed and economy.
(K7; *Ag, Cu, Al*)

97-K. (Dutch.) **Manufacture of Pipelines for High Pressure and Temperature.** W. J. Kaufman. *Lastechniek,* v. 23, Oct. 1957, p. 239-242.

Increasing pressures and temperatures lead to higher percentages of alloying elements and greater thicknesses of the walls. Both factors result in higher accuracy requirements. Principal manufacturing methods, beginning with bending. Data on welding problems, subdivided into fusion, arc and inert arc. (K1, T26r, 2-62, 3-74; AY)

98-K. (Dutch.) **Production in the Welding of Pipelines.** A. J. van der Velde. *Lastechniek,* v. 23, Oct. 1957, p. 243-246.

Experience in arc welding of pipelines of unalloyed steel. Advantages and disadvantages of various methods. Speed and quality, cost and production figures. 16 ref.
(K1, T26r; ST)

99-K. (Dutch.) **Welding of Boiler Tubes.** C. Nederveen. *Lastechniek,* v. 23, Oct. 1957, p. 251-253.

Excellent results are obtained on boiler tubes 2 to 6 in. diameter of unalloyed and low-alloy steel by welding the basic seam with argon-arc and filling with coated electrodes. (K1a, K1d, 4-60; ST)

100-K. (Dutch.) **Fusion Welding in the Installation of Pipelines.** H. Jansen. *Lastechniek,* v. 23, Oct. 1957, p. 254-260.

Survey of pipe joining methods without details on pipe construction. Use of welding in pipelines and its advantages explained by example. The safety of a pipeline requires, next to the selection of the right material, a suitable form of welding, the hiring of skilled welders and thorough checking of the welds. Welding has been found to be the most modern and advantageous method. 7 ref.
(K general, T26r; ST)

101-K. (Dutch.) **Welding of Thin-Walled Tubes in the Construction of Airplanes.** N. Groenendijk. *Lastechniek,* v. 23, Oct. 1957, p. 261-264.

Materials for seamless drawn tube; welding; shrinking of the material in welding. Welding methods—fusion arc, argon-arc, brazing. Welding of light alloys; welding of Cu and Cu alloys.
(K1, K8; EG-a39, Cu, 4-60)

102-K. (Dutch.) **The "Boxed" Welding of Rails.** G. Zoethout. *Lastechniek,* v. 23, Nov. 1957, p. 274-277.

For welding on the roadbed a new process named "boxed-in" welding uses a special basic electrode (Philips 250R). The essential feature is the great supply of heat, which has a favorable influence upon the weldability of rail.
(K1; T23q; ST)

103-K. (German.) **Welding in Railroad Car and Diesel Construction.** Karl Mesnaritsch. *Schweisstechnik,* v. 11, Oct. 1957, p. 109-116.

(K general, T23n, T23p)

104-K. Brazing Makes Metal Hose of Coiled Wire. Frederick C. Schaefer and Thomas Admerand. *American Machinist,* v. 10, Dec. 2, 1957, p. 109.

Spiral rolls are formed by feeding Cu wire with strips of Ni-Fe into winding machine. After compressing, rolls are brazed in furnace.
(K8j, 4-60; Ni, Cu, Fe)

105-K. New Methods of Testing Weldability. M. K. Shorshorov. *Canadian Metalworking,* v. 20, Nov. 1957, p. 66-68, 70-72, 80.

Three modern testing methods being used in U.S.S.R. 4 ref.
(K9s, 1-54; ST)

106-K. Tips on Welding Thick-Walled Vessels. *Iron Age,* v. 180, Nov. 14, 1957, p. 162-164.
(K1d, T26q; SS)

107-K. Vinyl Plus Aluminum. Robert G. Nau. *Modern Metals,* v. 13, Oct. 1957, p. 44-48.

Process for bonding vinyl film to Al; advantages and typical uses.
(K11d; Al)

108-K. Thick Plate Welding for Nuclear Energy Applications. *Welder,* v. 26, July-Sept. 1957, p. 66-71.

Murex Ltd., England, developed new low-hydrogen electrode to give proper impact properties.
(K1, Q6, W29h; 4-53, AY)

109-K. A Remarkable Welded Repair to a 3000-Ton Press. *Welder,* v. 26, July-Sept. 1957, p. 76-80.

Steps used in successfully repairing 12-in. thick wall of main cylinder. (K1, 18-72; CI)

110-K. Brazing for Greater Productivity. G. M. A. Blanc and Rene D. Wasserman. *Welding Engineer,* v. 42, Nov. 1957, p. 34-36.

Advantages of brazing for joining components in high production situations illustrated by several examples. (K8)

111-K. (Russian.) **Influence of Titanium and Nitrogen Upon Structure and Properties of Welds in High-Chromium Steel Sheet.** D. A. Odesskii and V. M. Vozdvizhenskii. *Metallovedenie*

i Obrabotka Metallov, v. 1, Sept. 1957, p. 42-46.

High-chromium steel containing 0.2% N is recommended for welding while high-chromium steel containing 0.3% Ti is not. 8 ref. (K9s, 2-60, 4-53; SS, *N, Ti*)

112-K. (Norwegian.) Bonding of Aluminum. Norwegian Aluminum Co. *Teknisk Ukeblad*, v. 104, Oct. 17, 1957, p. 1-3 of attachment.

Types of synthetic resins, listing manufacturers, properties and applications. (K12; Al)

113-K. Welding Applied to Diesel Locomotive Construction. K. S. Black. *Australasian Engineer*, v. 50, Oct. 8, 1957, p. 72-76.

(K general, T22n)

114-K.* Induction Soldering and Welding. Fritz Alf. *AEG Progress*, v. 3, 1957, p. 105-109.

Principles, technique, applications. (K6n, K7e, K8k)

115-K. Five Variations of Inert Arc Welding. *Industry and Welding*, v. 30, Dec. 1957, p. 46-47, 80-81.

Methods used to weld Al fuel tanks at Evans Reamer and Machine Co. (K1d; Al)

116-K. Can You Weld Chromized Parts? *Industry and Welding*, v. 30, Dec. 1957, p. 50-51, 55.

(K1d; ST, *Cr*, 8-74)

117-K.* Adhesives for Metals. A. E. Williams. *Iron and Steel*, v. 31, Jan. 1958, p. 11-14.

A film of adhesive between two metal surfaces comprises the adhesive-bonded joint, and any stresses in the component are transferred to this film so that the area of metal covered by the film has to be sufficiently large to permit the full load to be transmitted without unduly stressing the film. Experience shows that these requirements are best met by using a lap joint or a modification of this. (K12)

118-K. Welding and Brazing of Precipitation-Hardening Steel. F. K. Lampson. *Machine Design*, v. 29, Dec. 12, 1957, p. 180-182.

(K1d, K8; SS)

119-K. High-Speed Methods Weld to Aircraft "Specs". Gordon Parks. *Metalworking Production*, v. 101, Nov. 22, 1957, p. 2088-2092.

Inert-gas automatic welders speed production at Solar Aircraft Co. Improves quality of weld by regulating feed wire. (K1d, T24b, 1-52; SS, Ti)

120-K. "Squirt Gun" Welds Dissimilar Metals. A. R. Kemerer. *Metalworking Production*, v. 101, Dec. 13, 1957, p. 2220-2221.

Diaphragms for multistage steam turbines are squirt welded with 18-8 stainless steel wires and chromium-enriched flux. (K1e; SS, RM-q)

121-K. Dip Brazing Magnesium. William J. Graves. *Modern Metals*, v. 13, Jan. 1958, p. 40-42.

Two Mg alloys have been successfully brazed, M1A and AZ31B (FSI). The most satisfactory brazing filler alloy has been found to be AZ125. Dow brazing flux No. 452 has given the best results with this filler alloy in the manufacture of wave guide parts. (K8n, Mg, SGA-f)

122-K. Ultrasonic Welding. T. W. Black. *Tool Engineer*, v. 39, Dec. 1957, p. 111-113.

(K6, 1-74)

123-K. CO_2 Welding of Steel. R. W. Tuthill. *Tool Engineer*, v. 40, Jan. 1958, p. 82-86.

(K1d; ST)

124-K. Factors That Shape the Weldability of Aluminum Bus. *Welding Engineer*, v. 42, Nov. 1957, p. 39-42.

Characteristics of Al alloys and their influence on weldability; practices in welding Al bus bars. (K general, K9s; Al)

125-K. Dip Brazing Magnesium Eliminates Shrinkage Warpage Problems. William J. Graves. *Western Metalworking*, v. 15, Dec. 1957, p. 50-51.

(K8n; Mg)

126-K. (Dutch.) Welding Technique in the Metal Industry. F. L. Harteng. *Lastechniek*, v. 21, Dec. 1957, p. 295-303.

Consideration of welding in metal processing and as a technique in the joining of metals. Division of welding into its components. Seven diagrams designed to facilitate the solution of joining problems. (K general)

127-K.* (German.) Physics of Pressure Welding. Frederich Erdmann-Jesnitzer. *Aluminium*, v. 33, Nov. 1957, p. 730-739.

Theory and practical results in welding two pieces of metal, influenced by pressure, temperature and time. Welding without formation of a liquid phase; sintering, cladding, formation of built-up edges on tools in machining, interactions in welding and wear, effects of tem-

perature and time in welding of plastics and glass melting. 20 ref. (K5, L22)

128-K. (German.) **Welding and Cutting.** Bruno Waeser. *Chemiker-Zeitung,* v. 81, Sept. 20, 1957, p. 612-615.

Theoretical discussion, dealing particularly with corrosion phenomena. 8 ref. (K general, G22, R general)

129-K. (German.) **Modern Adhesives, Especially Epoxyd-Resins.** W. Schäfer. *Feingerate Technik,* v. 6, Sept. 1957, p. 390-393.

8 ref. (K12, NM-d34)

130-K. (German.) **Application of Adhesion Technique in Precision Tool Manufacturing.** L. Schreiner. *Feingerate Technik,* v. 6, Sept. 1957, p. 393-397.

Examples of versatility of epoxyd-resin in applications in vacuum technique, electrotechnics, optics and supersonics. (K12, NM-d34)

131-K. (German.) **Warping of Cylindrical Structures by Internal Stresses Caused by Welding.** F. W. Bornscheuer. *Schweissen und Schneiden,* v. 9, Nov. 1957, p. 492-494.

5 ref. (K general, Q25h, 7-51)

132-K. (German.) **Welding in the Vacuum Technique.** Werner Espe. *Vakuum-Technik,* v. 6, Aug. 1957, p. 91-98.

Examination of welding methods tested and approved in the high-vacuum technique, especially in fabrication of high-vacuum and gas-discharge tubes. (To be continued.) (K general, 1-73)

133-K. (Italian.) **Applications of Resistance Welding.** Oscar Grossi. *Macchine,* v. 12, Nov. 1957, p. 1057-1069.

Applications, techniques in fields of automotive vehicles, bicycles, motorcycles, electrical equipment, lightweight boiler elements, railroad equipment, steel industry, with numerous illustrations of equipment for specific jobs. (K3)

134-K.* (French.) **Applications of Welding in the Construction of Stainless Steel Railway Cars.** M. Thomas. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 345-351.

Because of its physical and mechanical properties, 18-8 type stainless is no more costly for railway car construction than ordinary steel and permits saving of 33% in weight. Sub-assemblies are prepared from bent and drawn components, welded mainly by spot, seam and double-spot welding processes. Details of equipment, fabricating principles. (K3n, T23p, 17-57; SS)

135-K.* (French.) **Some Resistance Welding Applications in the Field of Metal Framework Construction.** J. M. Labessoulhe. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 356-367.

Principles, advantages of spot welding; welding machines capable of assembling on an industrial basis two thicknesses of 25 mm., or three thicknesses of 20 mm.; examples of light-weight frame structures. (K3n; ST, SGB-s)

136-K.* (French.) **Metallurgy of Welding Certain Austenitic Heat and Corrosion Resistant Alloys.** Anthony H. Waterfield and Russel P. Culbertson. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 373-380.

Metallurgical properties of three corrosion resistant alloys (Ni-Mo, Ni-Mo-Cr, Ni-Mo-Cr-Fe) and three heat resistant alloys (Ni-155, Co-W-Ni-Cr, Ni-Cr-Mo-Fe) in light of their effect on welding techniques required. Methods available for stainless steel can be used provided proper precautions are observed. (K general, K9; SS, SGA-g, SGA-h)

137-K. (French.) **Welded Framework for G2 and G3 Nuclear Reactors at Marcoule.** J. Doat. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 391-396.

Framework of two buildings, each housing one reactor, consists of six box-shaped, articulated portal frames fabricated from 37/44 openhearth steel plate welded by semi-automatic submerged arc techniques. Details of shop and site work. (K1e, W11p, 17-57; ST, 4-53)

138-K. (German.) **On the Evaluation of Defective Welds Through X-Ray Examination and Fatigue Tests.** Hermann Möller and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 531-541.

Results of fatigue tests compared to those from perfect welds. Porous welds, welds with slag enclosures and with stringer-type structures in the sheet metal showed the same fatigue properties as the specimens with perfect welds. Thus minor internal defects are negligible in acceptability criteria for welds. This contradicts common practice. Only defects in the boundary between workpiece and weld are of serious consequence. 13 ref. (K9r, Q7a; ST, 9-69)

139-K. (German.) **Pressure Welding at Low Temperature.** H. Jacob. *Fertigungstechnik,* v. 7, Sept. 1957, p. 393-399.

Conditions for perfect pressure welding of various metals; factors in aluminum welding. Examples of applications. Influence of deformation velocity, formation of oxide layers, surface deformation, surface roughness and temperature upon the strength of the weld. 27 ref. (K5, 2-63, K9)

140-K.* **Dip Brazing Aluminum With Paste Filler Metal.** *Canadian Metalworking,* v. 21, Jan. 1958, p. 38, 40, 42, 44, 46.

Alumibraze is an Al-Si filler metal consisting of 88% Al and 12% Si (AWS designation BAlSi-4), and melts between 1070 and 1080° F. Alumibraze has been used with more than a dozen wrought alloys including types EC, 1100, 3003, 5050, 5052, 5056, 5254, 6053, 6061, 6062, 6063, 6066, X2219 and X5356, as well as several cast alloys. (K8n; SGA-f, Al)

141-K. How to Get Stronger Al-Fe Bonds. Samuel Storchheim. *Iron Age,* v. 180, Dec. 5, 1957, p. 136-138.

Experimental study of hot pressure bonding. Dependence of ultimate tensile strength of Al-Fe couples on time, temperature and pressure. Microstructure of bond. (K5k; Q27a, M27f; Al, Fe)

142-K. Weld Copper Cooling Coils for Fast Production. *Iron Age,* v. 180, Dec. 12, 1957, p. 135.

(K1d, W18a, 4-60; Cu)

143-K. Tips on Welding Stainless. H. F. Reid, Jr. *Iron Age,* v. 180, Dec. 26, 1957, p. 58-60.

(K general; SS)

144-K. Welding Stainless Steels. R. E. Paret. *Machinery,* v. 91, Nov. 8, 1957, p. 1095-1102.

(K general; SS)

145-K. Why Product Manufacturers Are Switching to Stitching. Kim Darby. *Modern Metals,* v. 13, Nov. 1957, p. 48-51.

Metal stitching or stapling speeds fabricating and assembling for variety of metal parts. (K13)

146-K.* **Something New in Joining Nonferrous Metals.** *Modern Metals,* v. 13, Nov. 1957, p. 70, 72.

Process employing complex chloride compound can join almost all nonferrous metals to each other except alloys high in Ni or Si. Joining takes place at temperatures below melting point of either metal. Electrical and mechanical properties of joint are similar to base metal properties. (K6, EG-a38)

147-K. Welding Rod Trends. R. K. Lee. *Steel,* v. 141, Dec. 9, 1957, p. 180-186, 191.

Functions and advantages of welding electrodes with coatings containing Fe powder. (K1a, W29h)

148-K. How To Weld Copper and Its Alloys. Pt. 1. Lester F. Spencer. *Steel,* v. 142, Jan. 27, 1958, p. 86-89.

Of the six possible methods, properties desired in the joint will determine choice. Rules for the inert-gas metal-arc method given. (To be continued.) (K general, K1d; Cu)

149-K.* **Fabrication of Stainless Steel Honeycomb Sandwich Structures.** W. J. Lewis, G. E. Faulkner and P. J. Rieppel. *Tooling and Production,* v. 23, Jan. 1958, p. 73-77.

Welding and machining honeycomb core of 17-7PH stainless steel; fabrication of edge members, techniques in cleaning and brazing sandwich panels.
(K general, G17, K8; SS, 7-59)

150-K. Assembly of Electric Iron Components. L. G. Northfield. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 394-396.

Spot welding operations in joining Ni-Cr strip to Ni-Ag leads and joining Ni-plated mild steel to Ni-Ag. (K3n, T10a; SGA-s, Ni, Cu, CN)

151-K.* **Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. Pt. 1.** C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 397-402.

Influence on weld porosity of sheet surface condition and microstructure, shielding gas impurities, surface of filler wire and inadequate shielding. Effect of cooling rate and welding speed on weld cracking. 10 ref.
(K1d, 3-67; AY, 4-30, 9-72)

152-K. Welding With Ultrasound. Thomas A. Dickinson. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 403-404.

Ultrasonic sound energy utilized to weld fine wire and foil components of both similar and dissimilar materials including Cu, Al, brass and stainless steel alloys. A 2000-watt unit made spot and seam welds in metal parts with thicknesses from 0.002 to 0.050 in.
(K3n, K3p, 1-74; Al, Cu, Zn, SS)

153-K.* **Welds Made Between Some Wrought and Cast Aluminum Alloys,**

and Welds in Some Cast Aluminum Alloys. J. C. Bailey, J. A. Hirschfield and T. Horwood. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 434-441.

Welding procedure and properties of welds made by tungsten-argon-arc and metal-arc welding processes between different combinations of wrought and cast Al alloys. Mechanical properties determined for combination of NS3, NS6, HS30, LM4-M, LM5-M and LM6-M alloys. (K1, Q general; Al)

154-K.* Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. Pt. 2. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 442-448.

Effect of cooling rate, base metal microstructure and metal composition on incidence of transverse cracking in welds made in SAE 4130 steel sheet by argon-shielded tungsten-arc welding procedures. Carbide segregation in form of pearlite banding exerted strong influence on weld cracking. Severe external restraint and increasing carbon content increased extent of cracking. 4 ref.
(K1d; AY, 4-30, 9-72)

155-K. Flash-Butt Weld Procedures for Extruded Titanium Parts. R. N. Foster. *Welding Engineer,* v. 43, Feb. 1958, p. 29-30.

Material most commonly welded by the resistance flash-butt process is the 99% pure Ti grade defined in ASM 4921, although many rings have been welded with various Ti alloys (A 110 AT, 1 50 A, and C 120 AV).
(K3, Ti, 4-58)

156-K. Air Compressors in Welding Operations. *Welding Engineer,* v. 43, Feb. 1958, p. 42-43.

(K3, W29q)

157-K. Automatic Submerged-Arc Welders Prime Aids at Harvester. D. L. Hansen. *Welding Engineer,* v. 43, Feb. 1958, p. 62-64.

Procedure followed at International Harvester Co. in welding the box section C-frame, corresponding to tractor size, to which the bulldozer blade is fastened.
(K1e, T4; ST)

158-K.* Performance of Welds in Some Aluminum Alloys. Paul B. Dickerson. *Welding Journal,* v. 37, Feb. 1958, p. 107-113.

Inert-gas-shielded-arc welding has improved performance in Al welds. Strength and ductility of butt welds in various Al alloys, longitudinal and transverse shear strengths of fillet welds, effect of temperatures from −400 to 700° F. upon the tensile properties and resistance to corrosion of several of the high-strength weldable alloys. (K1d; Al)

159-K. Uses of Oxygen and Acetylene Gases in the Refrigerator Industry. Paul Bowman. *Welding Journal,* v. 37, Feb. 1958, p. 120-123.

Applied to welding, braze welding, Ag brazing, and soldering.
(K2, K6q, K7, K8, RM-g30, RM-g33)

160-K. Revised Welding Practices Pay Off in the Jet-Engine Industry. F. J. Bacon. *Welding Journal,* v. 37, Feb. 1958, p. 124-126.

Fit-up standards, basic cause and results of loose fits.
(K general, S22, T24b)

161-K.* Development of Filler Wires for Welding SAE 4130, 4140 and 4340 Steels. H. W. Mishler, R. P. Sopher and P. J. Rieppel. *Welding Journal,* v. 37, Feb. 1958, p. 41s-48s.

Filler wires for inert-gas tungsten-arc and inert-gas consumable-electrode welding of high-strength low-alloy aircraft steels. Weld-metal porosity, weld-metal cracking tendency, heat treatment, response as compared with the base materials, strength of heat treated weld joint and weld metal toughness. Two filler wires were developed for welding each steel. One of each pair of filler wires had a composition similar to the base material, while the other was of dissimilar composition. (K1d; W29h, AY)

162-K.* High-Vacuum Electron-Beam Fusion Welding. W. L. Wyman. *Welding Journal,* v. 37, Feb. 1958, p. 49s-53s.

New vacuum process consists of bombarding two pieces to be fusion welded with a beam of electrons in a high-vacuum chamber. Basic elements are a tungsten cathode to emit a large number of electrons; a high potential, several thousand volts between the cathode and plate to accelerate the electrons; a focusing system to form the electrons into a beam, a vacuum chamber and pumping equipment to maintain a pressure of 5×10^{-3} mm. of mercury. Work directed toward development of Zircaloy-2 welding procedures.
(K6, 1-73; Zr)

163-K.* Nature of High-Temperature Brazing Alloy-Base Metal Interface Reactions. W. Feduska. *Welding Journal,* v. 37, Feb. 1958, p. 62s-73s.

Microstructural and hardness characteristics analyzed at brazed joint interfaces, in the unaged, aged and superheated conditions of combinations of five types of high-temperature base metals and three types of high-temperature brazing alloys. 6 ref.
(K8, M27f, Q29n; SGA-h, SGA-f)

164-K.* Weldability of Notch-Ductile Steels. L. Reeve. *Welding Journal,* v. 37, Feb. 1958, p. 74s-80s.

Weldability tests on a series of C-Mn steels, including a number of ND (notch-ductile) steels supplied in accordance with the new British Standard Specification 2762 (1956) for notch-ductile steels. CTS and Battelle cracking tests have been used. 7 ref.
(K9s, 1-54 ,CN)

165-K. (German.) **Welding and Cutting Aluminum With Rare Gas Shielded Electrodes.** W. Mantel and L. Wolff. *Aluminium,* v. 34, Jan. 1958, p. 36-40.

(K1d, G22h; Al)

166-K. (German.) **Influence of Gases in Arc Welding of Steel.** J. D. Fast. *Schweissen und Schneiden,* v. 9, Dec. 1957, p. 512-517.

Interaction between gas and liquid weld metal; formation of blowholes; aging phenomena and brittleness. 20 ref.
(K1, K9n, 9-68; ST)

167-K. (German.) **Influence of Hydrogen on the Properties of Welds.** P. C. van der Willigen. *Schweissen und Schneiden,* v. 9, Dec. 1957, p. 517-521.

15 ref. (K general, 9-72; H)

168-K. (German.) **Metallurgical Reactions Between Brazing Alloys and Base Materials.** Johanes Schatz. *Schweissen und Schneiden,* v. 9, Dec. 1957, p. 522-530.

Thermodynamic considerations in designing for brazing. 29 ref.
(K8, 17-51; SGA-f)

169-K. (Spanish.) **National Welding Contests.** I. Semprun. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec. 1957, 4 p.

Sixth and seventh national contests in oxy-acetylene and electric welding sponsored by Welding Institute of Spain to advance interest in techniques and standards of performance; results showed that many shops still do not have adequate training and inspection programs.
(K general, A5d, A6m)

170-K. (Spanish.) **Planning of Welded Structures to Increase Productivity.** G. Repeczky. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec. 1957, 14 p.

Pre-planning and coordination of design, welding methods, equipment, materials handling; time and cost estimates; responsibility of personnel in each area.
(K general, A4s, A5; SGB-s)

171-K. (Spanish.) **Welding Productivity in Japanese Naval Construction.** Masao Yoshiki and Hirosi Kihara. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec. 1957, 23 p.

Japanese shipyards are building 60,000-ton ore and oil transport vessels. Organization of welding departments, accounting and shop order procedures; techniques and equipment; figures on total welded lengths, weights of welded elements, man-hours; mechanical aids, electrode and flux consumption, power consumption; training of welders, metallurgical and technical problems.
(K general, A5, A6, T22)

172-K.* (Pamphlet.) **Soldering Aluminium.** A. D. A. Information Bulletin 23, Nov. 1957. 35 p. Aluminium Development Assoc., 33 Grosvenor St., London, W.1, England. 2 s.

Basic principles; alloys suitable for soldering; types of solders and fluxes; methods and equipment; soldering Al to other metals; characteristics of soldered joints; choice of solder and soldering methods. 14 ref. (K7; Al)

173-K. (Book.) **New Lessons in Arc Welding.** 301 p. 1957. Lincoln Electric Co., Cleveland 17, Ohio.

Basic information on theory and techniques. Lessons deal with welding of a variety of materials. Operating procedures and information on machines and electrodes. (K1)

174-K. Bonding Ceramics to Metal. Pt. 2. A. E. Williams. *Ceramics,* v. 9, Dec. 1957, p. 26-30.

Methods of bonding ceramic materials in pipe systems and filtration processes. (K11b)

175-K. (German.) **Submerged-Arc Welding.** M. Komers. *Schweisstechnik,* v. 11, Sept. 1957, p. 97-100.

The metallurgical processes involved in forming a weld depend upon the powdered flux and the bare wire electrode used in unshielded welding. Proper selection improves

the mechanical properties of the weld. Materials listed; application and economy in the re-use of flux. (K1e, W29h, W29j, 1-52)

176-K. Welded Castings Keep Turbines Humming. Robert N. Williams. *Industry and Welding,* v. 31, Feb. 1958, p. 36-37, 60.
(K1e, W11k, 17-57)

177-K. Dip Braze Your Aluminum Assemblies. James W. Maston. *Industry and Welding,* v. 31, Feb. 1958, p. 38-39, 60.
(K8n; Al)

178-K. Ultrasonic Welding Without Fusion. *Industry and Welding,* v. 31, Feb. 1958, p. 54, 56-57.
(K6r)

179-K. (German.) **Measuring Techniques in Resistance Welding.** Otto Gengenbach. *Schweissen und Schneiden,* v. 10, Jan. 1958, p. 1-12.
Characteristics; measurement of currents, electrode pressure and other parameters. 11 ref. (K3, K9r)

180-K. (German.) **Control Devices for Single and Multiple Operation in Resistance Welding.** Heinz Neumann. *Schweissen und Schneiden,* v. 10, Jan. 1958, p. 12-15.
(K3, W29c)

181-K. (German.) **Control Equipment for Continuous Seam Welding.** Albert Gericke. *Schweissen und Schneiden,* v. 10, Jan. 1958, p. 15-20.
5 ref. (K3p, W29c)

182-K. (Italian.) **Report on the Dynamic Behavior of Direct Current Rotary Arc Welding Machines. Fourth Group of Experimental Tests.** Antonio Carrer. *Rivista Italiana della Saldatura,* v. 9, Sept-Oct. 1957, p. 201-226.
Conclusion. (K1, 1-52)

183-K. Brazing Strip Eliminates Rejects. *Steel,* v. 142, Feb. 10, 1958, p. 83-84.
Prediffused to ferrous or nonferrous strip, Ag brazing alloy doesn't run on heating. The braze is continuous, uniform and covers the entire joint area. (K8, Q27a, Ag, SGA-f)

184-K. Aluminum Dip Brazing Produces Strong, Clean Assemblies Rapidly at Low Cost. M. E. James. *Western Metalworking,* v. 16, Jan. 1958, p. 41-43.
(K8n, T24b, T1c; Al)

185-K.* Bonding Ceramics to Metals. A. E. Williams. *Industrial Finishing (London),* v. 10, Jan. 1958, p. 22-26.
Examples of bonds between variety of metals and ceramic materials utilizing adhesives containing silicate rubber or synthetic resin base. (K11b)

186-K. Stress Relief of Weld Layers Assures Quality Repair. *Iron Age,* v. 181, Jan. 30, 1958, p. 98-99.
Stress relieving alternated with arc welding prevents accumulation of residual stresses which might cause cracking in repairing large cast steel crankshafts.
(K1a, J1a; ST, 5-60, 18-72)

187-K.* High Penetration Produces High Strength Brazed Joints. James W. Maston. *Modern Metals,* v. 14, Feb. 1958, p. 36-39.
Dip brazing of Al allows easier fabrication of complex parts which would normally require precision casting and machining. (K8n; Al)

188-K.* How to Weld Copper and Its Alloys. Pt. 2. Lester F. Spencer. *Steel,* v. 142, Feb. 24, 1958, p. 90-98.
Recommendations for metallic arc welding of copper, brass, silicon bronze, phosphor bronze and aluminum bronze; preferred techniques, electrode, pretreatment and joint design. (K1, Cu)

189-K. Equipment for Welding Reactive Metals. A. Mombrun and W. G. Hull. *Welding and Metal Fabrication,* v. 26, Jan. 1958, p. 9-11.
Vacuum welding chamber for tungsten inert-gas-shielded welding of Ti, Zr, Cb, Ta or V-base alloys under controlled conditions.
(K1d, 1-52, 1-73; Ti, Zr, Cb, Ta, V)

190-K. Portable Spot Welding Equipment. C. W. J. Vernon. *Welding and Metal Fabrication,* v. 26, Jan. 1958, p. 12-18.
5 ref. (K3n, 1-52)

191-K. A New Brazing Technique. Charles E. Rorick. *Welding and Metal Fabrication,* v. 26, Jan. 1958, p. 19-21.
Brazing of 17-7PH stainless steel honeycomb panels with Ag-Mn alloy in new graphite brazing fixtures at Convair. (K8, Ag, Mn, SS, 7-59)

192-K.* Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. Pt. 3. Effects of Welding Speed on Cracking. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication,* v. 26, Jan. 1958, p. 24-31.
Assessed by radiographic and visual examinations, the effect of welding speed varying from 4 to 22 in. per min. on number and length

of transverse cracks occurring in 0.055 and 0.104-in. thick welded sheet. Data obtained from metallographic examination, microhardness and macrohardness tests of welds formed at various speeds and patch and Pellini hot cracking tests indicate that cracking encountered occurred at or near solidus temperature. 4 ref.
(K1d, 3-67; AY, 4-53, 9-72)

193-K.* Welding Certain Heat and Corrosion-Resistant Alloys. Some Practical Aspects Reviewed. R. C. Perriton and R. T. Phillips. *Welding and Metal Fabrication,* v. 26, Mar. 1958, p. 98-102.

Welding techniques for Hastelloy alloys B, C, F and X; Multimet alloy (N155) and Multimet No. 25, to avoid poor bend contour, flux pockets, porosity, overheating and microfissuring.
(K-general; Ni, Co, SGA-g, SGA-h)

194-K.* Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. Pt. 5. Mechanism of Hot Cracking. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication,* v. 26, Mar. 1958, p. 103-110.

Transverse cracks probably occur at temperatures above the solidus, arising from interaction between effects due to metastability and construction. The extent of cracking is a function of welding speed and is increased by the presence of pearlite-ferrite banding and other microstructural features. 17 ref.
(K1d; AY, 4-53, 9-72)

195-K. Kaiser's 3 New Mig Techniques for Welding Aluminum. *Welding Engineer,* v. 43, Mar. 1958, p. 36-38.

To eliminate porosity and dross in welding Al, two new processes using argon or helium plus chlorine in the contact tube, with conventional gases in the nozzle, have been developed. A third method utilizes nitrogen in the gas nozzle, and argon or helium plus nitrogen in the contact tube. (K1d; Al)

196-K. Flux in Flame Finds Greater Applications. E. H. Conway. *Welding Engineer,* v. 43, Mar. 1958, p. 40-42.

In this brazing process, flux is held in solutions in a highly volatile, flammable liquid and fed to the torch tip in regulated amounts. Excessive fluxing is avoided, yet brazing surfaces are protected against oxidation. (K8g)

197-K.* Fusion Welding of Uranium. E. L. Brundige, Denton T. Doll, Gale S. Hanks and James M. Taub. Paper from "Nuclear Metallurgy", v. 4, AIME, p. 107-115.

Techniques for producing sound welds with uranium sheet, plate and shapes using inert-gas tungsten-arc process. Microstructure and mechanical properties of welds; other welding techniques. (K1d; U)

198-K. (Dutch.) **Vertical Welding Without Preliminary Processing.** A. J. v. d. Velde. *Lastechniek,* v. 24, Feb. 1958, p. 17-19.

In arc welding with normal electrodes the edges of the workpieces have to be given special shaping. In a modified process of vertical welding two welders work simultaneously and the preliminary processing can often be omitted. (K1)

199-K. (French.) **Electric Welding.** *L'Electricien,* v. 86, Jan. 1958, p. 6-9.

Generalities; power supply, technique of arc welding; use of metal electrodes; arc formation. (To be continued.) (K1)

200-K. (German.) **Welding Gray Iron With Small Heat Consumption.** G. M. Blanc. *Industrie Anzeiger,* v. 79, Aug. 16, 1957, p. 990-993.

(K-general; CI-n)

201-K. (German.) **New Experiment With Cold Pressure Welding and Cold Pressure Soldering.** Wilhelm Hofmann. *Industrie-Anzeiger,* v. 79, Nov. 15, 1957, p. 1435-1439.

This technique makes it possible to weld Al and Pb, and to solder iron and Pb. 13 ref.
(K6, K7; Al, Fe, Pb)

202-K.* (German.) **Welding of Heat Resisting Steels.** H. H. Weigand. *Schweissen und Schneiden,* v. 10, Feb. 1958, p. 44-49.

Welding of heat resisting austenitic steels is performed mostly by means of similar filler materials. Most favorable results result from arc welding with basic coated electrodes. Heat treatment of weld seam improves its quality. Hot cracking is promoted by sulphur, phosphorus and silicon and reduced by small amounts of carbon, manganese and ferrite. (K1, K9; SS, 9-72)

203-K.* (German.) **Experimental Analysis of the Joining Process in Soldering.** J. Colbus. *Schweissen und Schneiden,* v. 10, Feb. 1958, p. 50-54.

Mechanism of joining; temperature measurements in soldering; joints of the same parent and filler metals; tensile strength testing. Optimum joints demand a liquid layer between solder and parent metal. Minimal temperature at which a joint can be effected varies with different metals. (K7)

204-K. (German.) **Inert-Gas Tungsten-Arc Welding of Sheet Steel for Transformers and Dynamos.** J. Ruge and W. Rauchfuss. *Schweissen und Schneiden,* v. 10, Feb. 1958, p. 55-58.

(K1d, W11q, W11r, 17-57; ST, SGA-n, 4-53)

205-K. (German.) **Testing Materials in Welding.** M. Pfender. *Schweisstechnik,* v. 11, Nov. 1957, p. 121-135.

Composition and structure of materials, chemical and mechanical properties, resistance to the effect of attacking media; possibility of modifying the materials, new materials and combinations, necessity of developing methods and tools; importance of standards; problems of brittle fracture and vibration. 36 ref. (K9r)

206-K. (German.) **Basic Lime Coated Electrodes for High-Quality Welding.** Alfred Schmidt. *Schweisstechnik,* v. 11, Dec. 1957, p. 143-150.

Various types of lime coated electrodes. Welding techniques and applications. (K1a, W29h)

207-K.* **Semi-Automatic Welding.** Robert N. Williams and Herb Hinkel. *Industry and Welding,* v. 31, Apr. 1958, p. 48-51, 108-109.

Three processes use flux to shield the weld puddle: Unionarc uses a continuously fed wire electrode that is magnetically coated with flux and shielded by a flow of CO_2; dual shield, a continuous flux-cored electrode, is fed through gun equipment to the welding arc; mechanized squirt welder controls wire feed, flux flow and travel. Four processes use gas shielding: Wes-ing-Gun, a portable gas-shielded gun; Migarc, a gas-shielded welder; C-O manual uses CO_2 on mild steel to speed travel; Aircomatic uses same control box with one of three wire feeders and one of four guns. (K1d; 1-52)

208-K. Three Ways to Weld Aluminum Without Porosity. *Industry and Welding,* v. 31, Apr. 1958, p. 56, 80.

Three processes, Qualiweld, Econoweld and Chlorecon, involve addition of chlorine or nitrogen to the shielding gas. (K1d, K9, 2-60; Al)

209-K. Progress in the Joining of Aluminum. N. T. Burgess. *Metallurgia,* v. 57, Mar. 1958, p. 117-121.

Capabilities and limitations of various methods of joining Al. 9 ref. (K-general; Al)

210-K.* **Brazing Salvages Cracked Stampings.** E. H. Conway. *Steel,* v. 142, Mar. 3, 1958, p. 110-115.

Three procedures are necessary to make the technique work: peening to form V-shape depression the full length of crack, employing flame fluxing process which prevents oxidation of the surface and cleaning problem, and brazing with Ni-Ag filler rod. (K8; ST, 4-59)

211-K. Practical Application of Inert-Gas Metal-Arc Welding to Some Aluminum Alloys. E. M. Wilson. *Welding and Metal Fabrication,* v. 25, Dec. 1957, p. 474-481.

(K1d; Al)

212-K.* **Dip Brazing of Magnesium —Possible, Practical and Efficient.** William J. Graves. Paper from "Magnesium in Perspective", Magnesium Association, p. 400-403.

Dip brazing requires thorough prior cleaning and deburring. The joints show no cracks, little porosity under X-ray examination. Ultimate tensile strength drops about 10% due to heating; corrosion resistance equal to or better than similar welded items. (K8n; Mg)

213-K.* **Workable Method for Continuous Welding of Magnesium Proves Highly Efficient.** Ray Miles. Paper from "Magnesium in Perspective", Magnesium Association, p. 1500-1506.

Consumable electrode argon-arc welding, at speeds up to 80 in. per min., produces sound welds, with only minor "burn back" problems. (K1d; Mg)

214-K. (German.) **Brazing Hard Metals on Steel.** E. Luder, etc. *Fertigungstechnik,* v. 7, Oct. 1957, p. 449-452.

Pure Cu brazing metal with 2% ferrosilicon (45% Si) and borax flux at a furnace temperature of 1100-1200° C. gives a strong bond between the overlapping surfaces. The process, surface alloying conditions, Vickers hardness values of joint areas, results of microscopic examination. 8 ref. (K8; ST, SGB-q, *Cu*)

215-K.* (German.) **Influence of Hydrogen on Chemical Composition and Structure of Steel. Weldability of Killed and Rimming Carbon Steel.** Friedrich Erdmann-Jesnitzer and Paul Dammkohler. *Neue Hütte,* v. 2, Oct. 1957, p. 637-645.

Results of test welding; strength after cold bending; immersed arc welding; porosity; electrode evaluation. 25 ref.
(K9s, 2-60, 3-71; ST-c, ST-d, *H*)

216-K. (German.) **Effect of a Second Cutting Operation on the Stress Distribution in Shrink Fit Constructions.** H. Bühler and W. Schepp. *Werkstatt und Betrieb,* v. 91, Mar. 1958, p. 141-145.

Mathematical calculation of change in inherent stress and contact pressure. 12 ref. (K13r, Q25, G17)

217-K.* (German.) **Cold Pressure Welding and Brazing.** F. C. Fritz. *Werkstoffe und Korrosion,* v. 9, Jan. 1958, p. 4-7.

Lap brazing is rarely applied; butt brazing is used at places impossible to weld. Necessary tools and quality of the welds; historical discussion. 5 ref. (K5, K8)

218-K.* **Dual Fixturing Boosts Brazing Rate.** W. E. Atkinson. *Iron Age,* v. 181, no. 6, Feb. 6, 1958, p. 100-101.

Study of brazing line shows that duplicate fixtures at each induction machine will increase output of bicycle frames. Each operator can load a fixture while brazing is in progress in the duplicate one—this more than doubles production.
(K8k)

219-K. **Machine Soldering Cuts Costs, Doubles Small Shop's Output.** Robert Mortensen. *Iron Age,* v. 181, Mar. 27, 1958, p. 100-101.

(K7, T10d; Cu-a, Cu-n)

220-K. **How and Where to Use Shielding Gases for Welding.** O. T. Barnett. *Iron Age,* v. 181, Apr. 10, 1958, p. 91-98.

(K1d)

221-K. **Resistance Welding Joins Swing to Automation.** R. H. Eshelman. *Iron Age,* v. 181, Apr. 10, 1958, p. 99-103.

(K3, 18-74)

222-K. **Dip Brazing of Aluminum.** James W. Maston. *Light Metal Age,* v. 16, Feb. 1958, p. 8-11.

(K8n; Al)

223-K. **Welding in the Construction of High Vacuum Equipment.** *Welder,* v. 26, Oct-Dec. 1957, p. 94-98.

(K-general, W-general, 1-73)

224-K. **Welding Steam Generator Pipes at Marchwood Power Station.** J. W. Kocaba. *Welder,* v. 26, Oct-Dec. 1958, p. 99-102.

(K-general, W11g, W11k; 4-60)

225-K. **Spotlight on Arc Welding.** *Welder,* v. 26, Oct-Dec. 1957, p. 103-107.

(K1)

226-K. **Nonuniformity in the Area of Weld Seams.** L. S. Livshits, L. P. Bakhrakh and S. I. Panich. *Metallovedenie i Obrabotka Metallov,* Jan. 1958, p. 26-29. (Henry Brutcher, Altadena, Calif., Translation no. 4120.)

4 ref. (K9)

227-K. (English.) **Manual Arc Welding of Stainless and Heat Resisting Steels and Alloys With Fusible Electrodes.** *Aciers Fins & Speciaux,* no. 27, Dec. 1957, p. 106-110.

(K1a; SS)

228-K. **Spotwelding Titanium Is Practical.** W. R. Gain and D. E. Waite. *American Machinist,* v. 102, Mar. 10, 1958, p. 125-127.

(K3n; Ti-b)

229-K. **Welding Low-Alloy Steel Castings for High-Pressure and High-Temperature Service.** N. A. Chapin, C. H. Soldan and L. W. Songer. *American Society of Mechanical Engineers,* Paper no. 58-MET-4, Apr. 1958, 11 p.

(K-general; AY-b, 5-60, SGA-h)

230-K. **Welding Metallurgy of Cr-Mo-V Steels for High-Temperature Steam-Turbine Components.** R. J. Christoffel, R. M. Curran, F. H. Domina and C. H. Soldan. *American Society for Mechanical Engineers,* Paper no. 58-MET-7, Apr. 1958, 13 p.

7 ref.
(K-general, W11k; AY, *Cr, Mo, V*)

231-K. **How to Braze Stainless Steels. Pt. 3.** H. M. Webber. *Industrial Heating,* v. 25, Mar. 1958, p. 503-514; Apr. 1958, p. 708-710, 714.

(To be continued.) (K8j; SS)

232-K. **Production of Welded Steel Structures for Use in Aircraft.** B. R. Alsobrook. *Machinery (London),* v. 92, Mar. 1958, p. 548.

(K-general, T24, 17-57; ST)

233-K.* **Ultrasonic Welding — a New Technique Grows.** J. Byron Jones. *Metal Progress,* v. 73, Apr. 1958, p. 68-72.

Ultrasonic welding unites similar or dissimilar metals by introducing vibrational energy into the area to

be joined. Solid-state metallurgical bonds, comparable in strength to those resulting from conventional methods, are produced. Thin gages, even in high-temperature, corrosion resistant metals, are readily welded. (K6r)

234-K.* Which Adhesive for What? R. W. James and R. W. Gormly. *Product Engineering,* v. 29, Mar. 17, 1958, p. 79-81.

Structural adhesives are best under shear and tension while nonstructurals are better in peel and cleavage. Table of structural adhesives shows chemical type, bonding ability with metal, wood, glass, rubber, etc.; bonding requirements; resistance of bond to water, solvents, temperature; bond strength. (K12)

235-K. Leakproofing Sheet-Metal Assemblies. J. R. Spurgeon. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 209-210, 212.

New method of producing integral fuel tanks for aircraft using P.T.F.E. (polytetrafluoroethylene) adhesive tape as a sealing medium. (K12, T24, 4-53)

236-K. (German.) **Disadvantages in Soldering Copper Steels.** *Metall,* v. 11, Nov. 1957, p. 958-959.

(K7; ST, *Cu*)

237-K. (German.) **Soldering of Lead Cable Sheaths.** H. Johnen and W. Jung-Konig. *Metall,* v. 12, Jan. 1958, p. 38-42.

(K7, T1b)

238-K. (German.) **New Developments and Progress in the Field of Welding Metallurgy of Ferrous Materials.** K. L. Zeyen. *Oerlikon Schweissmitteilungen,* v. 16, Jan. 1958, p. 9-108.

Comprehensive survey of the literature of welding; improvement of quality of welds through various electrode coats; avoidance of welding stresses and deformation. 533 ref. (K-general)

239-K.* (German.) **Experiments for Measurement of Working Temperature in Brazing.** J. Colbus. *Schweisstechnik,* v. 12, Jan. 1958, p. 3-6.

Measuring technique; control experiments and results; working temperature lies between solid and liquid points of the solder. (K8, S16)

240-K. Brazing—Indefinitely Indispensable. P. D. Johnson. *Metal Treating,* v. 9, Mar-Apr. 1958, p. 2-5, 49-51.

(K8)

241-K. Liquid Cooling: Bernard's Answer to Hot, Slow Welding. *Welding Engineer,* v. 43, May 1958, p. 46-48.

A liquid cooling method which drains heat from electrodes and permits higher welding speeds. Used mainly on jobs requiring current of 700 amp. or more. (K1, 1-52)

242-K. New Automatic Process for Arc Welding Steel. *Welding Engineer,* v. 43, May 1958, p. 49-52.

Speeds up to 300 ipm. reportedly can be obtained with automatic welding process using a flux-containing coiled wire electrode which produces vapor shielding for an open arc. (K1)

243-K. Ultrasonic Welding Makes Rapid Advances. *Steel,* v. 142, Mar. 31, 1958, p. 80-81.

Method handles greater thicknesses, a wide variety of materials, produces stronger bonds, and is useful in seam welding and the joining of odd shapes. (K6r)

244-K. (Czech.) **Automatic Welding of Low-Alloy Steels Under Flux.** Julius Zeke. *Zvaranie,* v. 7, Jan. 1958, p. 2-8; v. 7, Feb. 1958, p. 54-56.

9 ref. (K1e; AY-b)

245-K. (Czech.) **Weldability of 3% Nickel, Chromium, Molybdenum, High-Carbon Steels.** Vaclav Pilous. *Zvaranie,* v. 7, Jan. 1958, p. 8-15.

8 ref. (K9s; SS-b, *Ni, Cr, Mo*)

246-K. (Czech.) **Welding of Locomotive Frames in the CKD-Works.** Rudolf Krnak. *Zvaranie,* v. 7, Jan. 1958, p. 19-23.

(K-general, T23n)

247-K. (Czech.) **Seam Butt Welding With Filler-Strip in Automobile and Motorcycle Production.** L. Pliva. *Zvaranie,* v. 7, Feb. 1958, p. 33-39.

(K3p, T10h, T21a; ST)

248-K. (Czech.) **Welding of Very Pure Aluminum for Production in the Chemical Industry.** Jaroslav Svejda. *Zvaranie,* v. 7, Feb. 1958, p. 49-53.

5 ref. (K-general, T29; Al-a)

249-K. (Czech.) **Argon-Arc Welding in Closed Vessels.** Jiri Lers. *Zvaranie,* v. 7, Feb. 1958, p. 57-59.

(K1d)

250-K. (French.) **How to Make Machinable Welds in Cast Iron.** *Machine Moderne,* v. 12, Mar. 1958, p. 67-68.

Factors influencing repair of broken castings by arc welding; cor-

rect choice of electrode and welding process. (K-general, G17k; CI, 5-60)

251-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Results of Studies Carried Out by Institut de Soudure. Pt. 1. General Purpose of the Study. Experimental Methods Used.** A. Gaubert. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 5-14.

By use of automatic fusion machine, test welds were made with various types of deep penetration electrodes; main factors likely to influence penetration were pin-pointed and studied. Special emphasis to angle of slope of plates to be joined. Study of weld penetration. (K1a)

252-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Results of Studies Carried Out by Institut de Soudure. Pt. 2. Use of Statistical Methods in Experimental Investigations.** G. d'Herbemont. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 15-20.

Quantitative study of influence of main factors governing penetration carried out by statistical methods. Experimental procedures; interpretation of results. In practice, each type of electrode can be assigned coefficients characterizing its behavior. (K9r, S12)

253-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Results of Studies Carried Out by the Institut de Soudure. Pt. 3. Results. Influence of Current Intensity and of Geometrical and Kinematic Parameters on Penetration.** A. Gaubert. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 21-24.

Penetration can be expressed linearly in terms of current, speed of feed, angle of slope and amount of separation between plates, and electrode diameter. Formula for practical use. Results of tests can be applied to manual as well as automatic welding. (K1a)

254-K.* (French.) **Welding of High-Temperature Steels and Alloys.** H. Gerbeaux. *Soudage et Techniques Connexes,* v. 12, Jan-Feb. 1958, p. 53-61.

Classification of steels and alloys according to service temperature limits; mechanical properties, applications of heat resistant metals; welding techniques available and conditions of use; role of stresses, temperature and atmosphere in selection of metals for specific applications. (K-general, 17-57; SGA-h)

255-K. (German.) **Efficiency of Current Sources in Arc Welding.** E. Bergmann. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 77-79.

Characteristics of transformer, motor-generator, rectifier and multi-operator system used in arc welding; comparison of properties; principles for choice of suitable power sources in welding practice. (K1, W29c)

256-K.* (German.) **Welding of Titanium.** Klaus Rüdinger. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 79-86.

Effect of oxygen and nitrogen on properties of weld; preparation of welding surfaces; required purity of protective gas; use of protective chamber and other protective methods; suitable velocity of protective gas stream; conditions in arc welding of Ti; heat treatment and mechanical properties of weld. (K-general; Ti)

257-K.* (German.) **Inert Tungsten Arc Welding of Nodular Cast Iron.** Jürgen Ruge and Werner Zitzelsberger. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 86-90.

Investigation on welding technique; effect of welding conditions; pre-treatment and post-treatment; use of heterogeneous covering materials; structure and mechanical properties of weld. Practical tips for welding technique. (K1d; CI-r)

258-K.* (German.) **Tensile Strength and Bending Angle of Fusion Welded Notched Specimens.** H. Fiehn and K. Teske. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 90-93.

Examination of mechanical properties on welded sheets by notch tensile and notch bending tests. Preparation of specimens and experimental technique. Effect of impairments of welded parts on their properties. Evaluation of results. (K9r, Q-general, 1-54)

259-K. (Italian.) **Pipe Welding. Pt. 7. Techniques and Accessories Employed.** Carlo Losito. *Rivista di Meccanica,* no. 178, Feb. 1, 1958, p. 9-15.

5 ref. (To be continued.) (K-general, 4-60)

260-K. Automatic Brazing Speeds Making of Coils for Carrier Corp. Harry E. Miller. *Industrial Gas,* v. 36, Apr. 1958, p. 6-8.

(K8, 18-74; Cu, 4-60)

261-K. How to Braze Stainless Steels. Pt. 1. H. M. Webber. *In-*

dustrial Heating, v. 25, Feb. 1958, p. 247-254, 400-402.

Important considerations and characteristics of base and filler metals so that proper thickness of joint, required wettability and optimum furnace conditions can be ascertained to insure tight bonds. (K8j; SS)

262-K. 5 New Brazing Alloys for High-Temperature Service. A. M. Setapen. *Industry & Welding,* v. 31, May 1958, p. 51-52, 54-55.

Composition, properties and industrial applications of Ag-Cu-Li, Ag-Pd, Mn-Ni, Ni-Cr-Si-B and Au-Cr-Ni heat resistant alloys for rocket and jet engine assemblies. (K8, SGA-h, SGA-f)

263-K. Designed for Arc Welding. G. A. Marberg. *Industry & Welding,* v. 31, May 1958, p. 58, 62-63.

Welded equipment for processing and manufacturing can be built faster at less cost because no patterns are needed, slow casting and machining are avoided, standard steel shapes and weld symbols are used for designing. The equipment made will be lighter, sturdier and better looking. (K1, 7-51, 17-51)

264-K. Design and Fabrication by Welding of the Carquinex Strait Bridge. Leonard C. Hollister. *Welding Journal,* v. 37, Apr. 1958, p. 309-319.

Cantilever truss-type structure fabricated by submerged arc welding of T-1 steel. (K1e, T16n, 17-51; ST)

265-K.* Automatic Welding of Aircraft Accessory Turbine Wheels. A. J. Rosenberg and E. W. Jamison. *Welding Journal,* v. 37, Apr. 1958, p. 328-335.

Development of automatic inert-gas-shielded metal-arc welding procedure for turbine wheels consisting of AISI 4340 steel hubs and cast cobalt-base high-temperature alloy buckets. Difficulties including radial cracking, fusion-line cracking, transformation cracking, center-bead cracking and porosity. Procedure for minimizing defects; comparison of automatic and manual metal-arc welding processes.

(K1d; AY, 9-72, 9-68)

266-K.* Tungsten-Arc Welding of 0.002-In. and 0.005-In. Stainless Steel and Titanium. Jay C. Collins and S. P. Jenkins. *Welding Journal,* v. 37, Apr. 1958, p. 342-347.

Equipment, procedure and mechanical properties of joints in welding 0.005-in. 17-7PH stainless steel by helium-shielded tungsten-arc process. Flange-type joint gave welds of satisfactory dimensional tolerance. (K1d; SS, Ti)

267-K.* New Forge Welding of Aluminum and Magnesium Alloys. L. A. Cook and D. G. Shafer. *Welding Journal,* v. 37, Apr. 1958, p. 348-358.

Principles, equipment and procedure for forge welding high-strength Al and Mg alloys. Metallographic, hardness and tensile characteristics of weld. Welds in high-strength Al and Mg alloys developed 95 to 100% joint efficiency. 44 ref. (K5; Al, Mg)

268-K.* Spot Welding of Ti-6Al-4V Alloy. R. K. Nolen, J. F. Rudy, H. Schwartzbart and H. D. Kessler. *Welding Journal,* v. 37, Apr. 1958, p. 129s-137s.

Electrode geometry, weld time, electrode force, welding current and weld spacing were varied to determine their relation to cross tension strength, tension shear strength, microstructure and elevated-temperature strength of spot welds made in Ti-6 Al-4V alloy. (K3n; Ti-b)

269-K.* Seam Welding Galvanized Steel. W. J. Allen and M. L. Begeman. *Welding Journal,* v. 37, Apr. 1958, p. 138s-143s.

Changes in welding current, current timing and electrode force required to produce acceptable seam welds with zinc-coated steel sheet. Effect of Zn coating on mechanical properties, metallurgical characteristics and corrosion resistance of the weld metal. (K3p; ST, *Zn,* 8-65)

270-K.* Hydrogen in Mild Steel Welds. M. LeFevre. *Welding Journal,* v. 37, Apr. 1958, p. 168s.

Effects of moisture in electrode coat, humidity, interpass temperature, time interval between passes and degassing on the hydrogen content of mild steel welds. (K1a; CN, *H,* 7-51)

271-K.* Effects of Steel-Making Practice on Submerged-Arc Weld Porosity. James T. Lapsley. *Welding Journal,* v. 37, Apr. 1958, p. 169s-178s.

Nominally similar low-carbon steels representing four deoxidation practices including Al-Si semikilled, Si semikilled, Al-capped and mechanically capped steels were welded by submerged-arc processes. Ef-

fect of deoxidation practice, teeming sequence, ingot variations, rolled sheet variations and chemical composition on weld porosity.
(K1e, D-general, 3-70; CN-g, 9-68)

272-K.* Dynamic Measurement of Stress Associated With Weld Cracking. S. S. White, W. G. Moffatt and C. M. Adams. *Welding Journal,* v. 37, Apr. 1958, p. 185s-192s.

Techniques and specimen geometries developed which permit dynamic measurement of stresses during and after welding by use of conventional strain gages. Measurements and stress analysis indicate medium-carbon filler welds on Mn-Mo steel plate can support maximum stress of about 40,000 psi. before cracking of the welds during cooling and that low-carbon, low-alloy filler welds in the same material can support a maximum stress of about 25,000 psi. Maximum transverse distributed load which precedes cracking appears to be less dependent on welding conditions than upon filler compositions. 19 ref. (K9r, Q25; 7-51, 9-72)

273-K. How to Weld Copper and Its Alloys. Pt. 4. Lester F. Spencer. *Steel,* v. 142, May 5, 1958, p. 106-108.
(K3, 4-53; Cu)

274-K.* Welding of Molybdenum. W. N. Platte. Paper from "The Metal Molybdenum", American Society for Metals, p. 151-191.

Shielding is necessary to prevent contamination of the weld metal by oxygen and nitrogen. For sound welds with maximum ductility, welding atmosphere must contain less than 0.005% O. Nitrogen in the argon should be low enough so it will not enter the weld metal. Addition of 0.5% Ti to Mo containing 0.05% C will give the best (lowest) ductile bend transition temperature for welds. 11 ref. (K1d; Mo)

275-K.* Brazing of Molybdenum. Robert E. Monroe. Paper from "The Metal Molybdenum", American Society for Metals, p. 192-198.

Tabulation of suitable filler metals. Molybdenum can be furnace brazed in inert or hydrogen atmospheres or in vacuum, oxy-acetylene torch brazed with suitable fluxes, and induction brazed. Properties of joints. 6 ref. (K8; Mo)

276-K. (Czech.) **Automatic Resistance Butt Welding From the Point of View of Economy in Production.** Boleslav Vrana. *Zvaranie,* v. 7, Mar. 1958, p. 75-79.
(K3)

277-K. (Czech.) **Adjustable Time-Panels for Asynchronous Control of Spot-Welders.** Karel Jarsky. *Zvaranie,* v. 7, Mar. 1958, p. 79-83.
(K3n, W29c)

278-K. (French.) **Use of Inert Gases in Automatic and Semi-Automatic Welding.** G. Grenier. *Technique Moderne,* v. 50, Feb. 1958, p. 41-43.
(K1d)

279-K. Ferritic-Austenitic Weld Joints in Thermal Power Stations. F. Zimmer. *Engineers Digest,* v. 19, Mar. 1958, p. 99-102. (From *Revue de Mecanique Appliquee,* v. 3, no. 4, Oct. 1957, p. 162-174.)
(K9n; ST)

280-K. High-Strength Steel Weldments. B. R. Alsobrook. *Machine Design,* v. 30, Feb. 20, 1958, p. 181-184.
(K1, T24a, 7-51; ST)

281-K.* A Look at High Frequency Resistance Welding. Wallace C. Rudd. *Metal Progress,* v. 73, May 1958, p. 82-86.

In addition to welding the old stand-bys, steel, Al and Cu, it is claimed that the high-frequency process will join dissimilar metals, reactive metals and thin-walled stock better and faster than ever. The welding current penetrates scale and oxide layers. (K3)

282-K. Bonding Magnesium Sheet. R. J. E. Hunter. Digest of paper given before Committee on Bonded Structures, Society of Aircraft Materials and Process Engineers, Jan. 1957. *Metal Progress,* v. 73, May 1958, p. 130, 134, 136-138.

Magnesium sheet alloy-ZE 41 containing 4% Zn and 1% Ce, in condition H 24 and in thicknesses from 0.032 to 0.080 in., is being bonded to doublers, boundary angles and stiffeners. (K12; Mg, 4-53)

283-K. Welded Stainless Steel Hollow Core. Michael Watter. *Missiles and Rockets,* v. 3, Mar. 1958, p. 104-105, 107-108, 110.
(K3, T24e, 17-57; SS)

284-K. Dip Brazing Aluminum. James W. Matson. *Pacific Factory,* v. 89, Mar. 1958, p. 36-39, 56.
(K8n; Al-b)

285-K. Welding Copper-Base Alloy Tubes. J. F. Sebald and L. H. Hawthorne. *Power,* v. 102, Mar. 1958, p. 94-97, 196, 198, 200.

Experiments to eliminate joint leaks, weld distortion and to im-

prove resistance to cyclic stress. (K1d; 4-60, Cu-b)

286-K. Welding Copper-Base Alloy Tubes. J. F. Sebald and L. H. Hawthorne. *Power,* v. 102, Apr. 1958, p. 92-95, 194, 196, 198, 202-204.

Distortion and mechanical strength of joints made by welding Cu-base alloy tubes; effect of weld sequence on distortion; strength of welded tube-to-tube sheet joints. (K1d; Cu-b, 4-60)

287-K. Brazing Alloys Tackle Heat Barrier. *Steel,* v. 142, May 19, 1958, p. 140-142.

(K8, SGA-h)

288-K. How to Weld Copper and Its Alloys. Pt. 5. Lester F. Spencer. *Steel,* v. 142, May 26, 1958, p. 122-123.

(K-general, K8, Cu)

289-K. Attaching Carbide Tips to Steel Bodies. Frank E. Montie. *Tooling and Production,* v. 24, Apr. 1958, p. 83-86.

(K-general; 6-69, ST)

290-K. Welding Applications at Derby C & W Works. Pt. 1. A. E. Bates. *Welder,* v. 27, Jan-Mar. 1958, p. 2-10.

Welding steel frames and other railroad car components. (To be continued.) (K-general, T23p)

291-K. Flux-Free Brazing in Reducing Atmospheres. N. H. Jones. *Welding and Metal Fabrication,* v. 26, Feb. 1958, p. 46-52.

(K8; ST)

292-K. The Selection and Welding of Thick Plate for Nuclear Power Applications. A. S. Ailes and W. I. Pumphrey. *Welding and Metal Fabrication,* v. 26, p. 62-66.

(K-general, W11p; ST, 4-53)

293-K. Weld Pointers for High Temperature Materials. L. F. Yntema. *Western Metalworking,* v. 16, Apr. 1958, p. 43.

Procedure and precautions for welding Cb, Ta and Mo.
(K-general; Cb, Mo, Ta, SGA-h)

294-K. Ductile Brazing Alloys Required for Reactors. Peter Patriarca. *Western Metalworking,* v. 16, Apr. 1958, p. 44.

(K8, T11; Ni-b, SGA-f)

295-K. Trio of New MIG Welding Techniques Reduce Dross, Porosity at Low Cost. M. B. Kasen and A. R. Pfluger. *Western Metalworking,* v. 16, Apr. 1958, p. 46-47.

Metal inert-gas welding process utilizes chlorine gas mixture in addition to argon for helium shielding to produce low-porosity, dross-free Al welds. Econoweld process uses inner stream of inert gas and outer stream of nitrogen for shielding. (K1d; Al-b)

296-K. Special Welding Techniques for Petrochemical Vessels. Darwin Christofferson. *Western Metalworking,* v. 16, Apr. 1958, p. 48.

(K-general, T22g)

297-K. Dry Hydrogen Brazing for Complex Stainless Assemblies. Harry Lewis. *Western Metalworking,* v. 16, Apr. 1958, p. 52.

(K8j; SS)

298-K. Thermal Expansion as a Basis for Control of Spot Welding of Duralumin. Yu. A. Pachentsev. *Avtomaticheskaya Svarka,* v. 9, no. 3, 1956, p. 65-71. (Henry Brutcher, Altadena, Calif., Translation no. 3978.)

Previously abstracted from original. See item 477-K, 1957.
(K3, P11; Al)

299-K. Arc Welding With Various Shielding Gases. A. V. Petrov. *Svarochnoe Proizvodstvo,* no. 8, Aug. 1957, p. 6-10. (Henry Brutcher, Altadena, Calif., Translation no. 4115.)

Advantages of adding certain quantities of carbon dioxide, oxygen, nitrogen or hydrogen to argon, for argon arc welding, or of using carbon dioxide alone. (K1d)

300-K. (French.) Factor Control in Inert - Gas - Shielded Tungsten - Arc Welding. E. B. La Velle. *Revue de la Soudure,* v. 14, no. 1, 1958, p. 1-16.

Detailed analysis of the large number of interrelated factors, including electrical, atmospheric, electrode and workpiece factors, that may be statistically controlled or adjusted for best economic utilization of the process. (K1d)

301-K.* (French.) Welding Cracks in the Transformation Zone of Alloy Steels Hardened in Air. H. Sekiguchi and T. Kobahashi. *Revue de la Soudure,* v. 14, no. 1, 1958, p. 51-58.

The time interval between welding and the appearance of cracks was determined with the aid of a method whereby the cracking process was checked by postheating treatment. Three types of heat treatment, preheating, complementary heating, and postheating were found suitable for crack prevention. Hydrogen does not play an important part in all types of cracks. 7 ref. (K9, AY)

302-K. (Japanese.) **Intert-Gas-Shielded Tungsten Arc Welding of 90-10 Copper-Nickel Alloy.** Keiichi Mizuno. *Sumitomo Metals,* v. 9, Oct. 1957, p. 231-244.

10 ref. (K1d; Cu, *Ni*)

303-K. (Spanish.) **Plan for a Series of Tests of Strength of Horizontal Position Welds.** R. J. Schor and Th. A. C. Van Tongeren. *Ciencia y Tecnica de la Soldadura,* v. 8, Jan-Feb. 1958, 13 p.

8 ref. (K9r, T27a)

304-K. Research Probes Adhesion. *Chemical and Engineering News,* v. 36, June 2, 1958, p. 93.

Molecular models shed light on adhesion, offer way to pick out best adhesive for a given job. (K12)

305-K. How to Weld Copper and Its Alloys. Pt. 3. Lester F. Spencer. *Steel,* v. 142, Mar. 17, 1958, p. 110-116.

(K1h, K2h; Cu-b)

306-K. Paste Solders Automate Assembly. *Steel,* v. 142, June 2, 1958, p. 68-69.

Furnace soldering and brazing with metered paste. (K7g, K8j, 18-74)

307-K.* Automatic Machines Expedite Arc Welding. D. L. Hansen. *Tooling and Production,* v. 23, Mar. 1958, p. 61-64.

Typical of large assemblies involving much arc welding are the blades required on bulldozers and on graders. One such blade includes a heavy curved plate and welded to this are stiffening and supporting members involving several long automatic welds. (K1e, 1-52, K13p, T3n)

308-K. A Wine Tanker With a "Stainless" Reputation for Quality. Philip Ferry. *Welding Engineer,* v. 43, Apr. 1958, p. 38-39.

Welding the world's first tanker designed principally for wine transportation. (K1e, T22j; SS, SGA-g)

309-K. (Czech.) **Evaluation of Fluxes for Automatic Welding as Regards Their Suitability for Molten Slag Welding.** Julius Zeke. *Zvaranie,* v. 7, Apr. 1958, p. 97-102.

(K1e, 18-74; RM-q)

310-K. (Czech.) **Oxidation of Metal in Arc Welding.** A. A. Jerochin. *Zvaranie,* v. 7, Apr. 1958, p. 109-112.

Metallurgical conditions causing some metals to oxidize in welding. For the given materials oxidation is found to progress more intensely when welded with a limestone-coated electrode than in an atmosphere of CO_2. 10 ref. (K1a, K1d, R1h)

311-K. (Dutch.) **Welding of Stainless Steel.** B. Mulder. *Lastechniek,* v. 24, Apr. 1958, p. 51-57.

Scratches, slight damages, small dents or nicks, etc., permissible in ordinary steel plates, cannot be tolerated in high-luster stainless steels. This raises some practical problems on the grinding and polishing of the welded joints of stainless steel plates. (K-general; L10b, SS)

312-K. (French.) **Welding Metallurgy, on the Basis of the Papers Presented at the Public Session of the International Institute of Welding, Essen, July 1, 1957.** H. Granjon. *Soudage et Techniques Connexes,* v. 12, Mar-Apr. 1958, p. 85-100.

Analysis of 26 papers grouped under the following items: development and properties of the molten zone (welding atmosphere, dissolution of gases, effect of hydrogen); behavior of the base metal (ferritic, martensitic and austenitic steels, nonferrous metals such as Ti, Mg, Ni and Al); metallurgy of the bonding zone. 26 ref. (K-general)

313-K.* (German.) **Load-Carrying Capacity of Silver Brazed Joints in Thin-Walled Steel Tubes.** Helmut Koch and Karl-Ludwig Poth. *Schweissen und Schneiden,* v. 10, Apr. 1958, p. 114-119.

Experiments with Ag brazing of various joints on steel tubes. Technique and results. High tensile and shear strength reached. (K8; ST, 4-60)

314-K.* (German.) **Influence of Current Strength on Arc Welded Butt Joints From the Economic and Qualitative Point of View.** C. Stieler. *Schweissen und Schneiden,* v. 10, Apr. 1958, p. 119-125.

Investigation on relationship between current strength, diameter of electrodes and welding speed using bare and covered electrodes. Influence of current strength on mechanical properties of weld. (K1a, K1g)

315-K.* (German.) **Effect of Welding Method on Discoloring of Welds During the Anodizing of Welded Joints in**

Aluminum and Aluminum Alloys. J. Ruge and Zitzelsberger. *Schweissen und Schneiden,* v. 10, Apr. 1958, p. 125-131.

Experiments with various methods, materials, edge preparation, welding conditions; effects of microstructural processes produced by welding. Discoloring in homogeneous and heterogeneous alloys.
(K-general, L19; Al)

316-K.* Welding Low-Alloy Steel Castings. N. A. Chapin, C. H. Soldan and L. W. Songer. *Foundry Trade Journal,* v. 104, May 22, 1958, p. 597-600.

Fabrication and repair welding of large alloy steel castings for use in steam turbines operating up to 566° C. and at pressures up to 1.6 tons per sq.in. Castings vary in weight from 1000 lb. to about 35-36 tons.
(K-general, W11k, AY, 5-60)

317-K. Resistance Seam Welding Fits Into High-Speed Lines. C. E. Roth. *Iron Age,* v. 181, June 5, 1958, p. 130-131.

Integrated process line of this type in operation at Buick for production of Dynaflow transmission stator rings. (K3p, T21b)

318-K. Successful Welding for Maintenance. M. Kolb. *Petroleum Refiner,* v. 37, May 1958, p. 207-210.

(K-general, 18-71)

319-K. New Process Features Close Control of Brazing Heat. *Welding Engineer,* v. 43, June 1958, p. 38-39.

(K8; Al-b, Mg-b)

320-K. Welding of Gears Under Protection of Carbon Dioxide. N. N. Belous. *Svarochnoye Proizvodstvo,* no. 3, 1956, p. 20-22. (Iron and Steel Institute Translation no. 729.)

Previously abstracted from original. See item 260-K, 1956.
(K1; CN, AY)

321-K. 13KH3GNMA Welding Wire for the Automatic Welding of 30KLGSA Steel. T. M. Slutskaya. *Avtomaticheskaya Svarka,* Mar-Apr. 1956, p. 12-17. (Iron and Steel Institute Translation no. 730.)

Previously abstracted from original. See item 317-K, 1956.
(K1, W29h; ST)

322-K. (German.) **Economical Assembly of Copper Pipes With Soldered Fittings.** Wolfgang Schmidt. *Werkstatt und Betrieb,* v. 91, Apr. 1958, p. 165-168.

4 ref. (K7, K8; Cu, 4-60)

323-K.* (Book.) **Brazing Manual.** 28 p. 1958. All-State Welding Alloys Co., Inc. White Plains, N. Y.

Brazing sheet, tappings, tubings and assemblies of Cu, brass, steel, stainless steel, cast iron or Al. Techniques, properties and uses of fluxes. (K8)

324-K. (Book.) **Welding Handbook.** Section 1. 4th Ed. 1957. 560 p. American Welding Society, 33 East 39th St., New York 18, N. Y. $9.

Divided into five major sections, new sections being published at the end of each year. Major topics include standard definitions, conversion factors, thermal properties of welded joints, thermal and mechanical treatment of welds, inspection and tests, design techniques and safe practice. (K-general; 11-68)

325-K. (Book.) **Welding Directory, 1958/1959.** 1957. 680 p. Industrial Publishing Corp., 812 Huron Rd., Cleveland 15, Ohio. $6.50.

Directories of welding, brazing and cutting products; trade names; catalog and specification data; reference material; geographical buyers guide.
(K-general, 11-67, 11-62, 11-69)

326-K. Resistance Welding of Platinum-10 Per Cent Rhodium Wire to Platinum Sheet. C. E. Moeller. *American Society of Mechanical Engineers,* Paper no. 57-A-118, Aug. 1957, 9 p.

(K3; Pt, 4-53, 4-61, SGA-a)

327-K. High-Temperature Brazing Looks Good for Missile Parts. John V. Long and George D. Cremer. *Aviation Age,* v. 29, May 1958, p. 30-31.

(K8, T24; Ag, SS)

328-K. A Method for Soldering Aluminum. G. M. Bouton and P. R. White. *Bell Laboratories Record,* v. 36, May 1958, p. 157-160.

New technique using Zn-base solders. (K7; Al-b)

329-K. How to Braze Stainless Steels. Pt. 4. H. M. Webber. *Industrial Heating,* v. 25, May 1958, p. 895-896, 898, 900, 902, 904.

(Concluded.)
(K8j, W29j, 1-73, 2-67; SS)

330-K. Six Steps for Dip Brazing of Magnesium Assemblies. William J. Graves. *Industry and Welding,* v. 31, June 1958, p. 38-39.

Magnesium alloy parts dip brazed with parent metal base filler alloys in chloride-base fluxes.
(K8n; Mg-c, RM-q)

331-K. New High Speed Automatic Welding Process. *Industry and Welding,* v. 31, June 1958, p. 51, 65.

Process and equipment using new flux-containing, coiled wire electrode; arc welds 16-gage to ½-in. steel at speeds to 300 in. per min. (K1, 1-52)

332-K. Flash Welding Jet Rings Cuts Cost. *Industry and Welding,* v. 31, June 1958, p. 52, 54.

Preshaped Ti used for jet engine rings reduces cost of machining. Rings are made in three steps; forming, flash welding and sizing. (K3r; Ti)

333-K. Alloy Selection for Brazing. L. V. LaRou. *Machine Design,* v. 29, Nov. 1957, p. 132-135.

Criteria in selection of Ag or Cu brazing process. (K8; Cu, Ag, SGA-f)

334-K. Sandwich Panel Adhesives. R. K. Humke. *Product Engineering,* v. 29, May 1958, p. 56-60.

(K12, 7-59; NM-d34)

335-K. New Welder Saves Firm $150,000 Yearly. *Steel,* v. 142, June 9, 1958, p. 88-89.

(K1d, K9, 1-52)

336-K.* Factors Affecting Weldability of High Strength 1 Per Cent Chromium-Molybdenum and Other Steels. F. J. Wilkinson and C. L. M. Cottrell. *Welding and Metal Fabrication,* v. 26, May 1958, p. 171-184.

Study of factors affecting hot cracking in weld made in SAE 4130 and other steels of similar composition by means of argon-shielded tungsten-arc process. Influence of sulphur, phosphorus and carbon content, grain size, microstructural conditions and heat treatment on crack sensitivity. Sulphur found to be major cause of cracking. Effect of sulphur increased by raising level of phosphorus. Increasing carbon content likewise reduced resistance to cracking by modifying effect of sulphur. 24 ref.
(K9s, 2-60; AY, *Cr, Mo*)

337-K.* Fusion Welding of Titanium in Jet-Engine Applications. H. W. Hoefer. *Welding Journal,* v. 37, May 1958, p. 467-477.

Welding chambers, shielding equipment, welding variables and results obtained in joining commercially pure Ti and alpha-alloy and alpha-beta Ti alloys by inert-gas-shielded tungsten-arc and metal-arc processes. Problem of porosity and its relation to welding speed, weld chill and joint design. Control of weld embrittlement. Note on resistance welding. 5 ref.
(K1d, K3; Ti-b, 7-51, 9-68)

338-K.* Cracking Associated With Porosity in Titanium Welds Over 0.125 In. Thick. R. P. Olsen and J. Gates. *Welding Journal,* v. 37, May 1958, p. 478-483.

Inert-gas tungsten-arc welds were made in 0.125 and 0.18-in. sheet of titanium alloy containing 2½% Sn and 5% Al. X-ray examination failed to reveal presence of microcracks demonstrated by metallographic investigation. Microhardness survey, chemical analysis, X-ray studies and metallographic examinations made to establish cause of cracks. Tensile loading of weld specimens revealed that inert-gas metal-arc process produced crack-free welds under conditions which resulted in cracking with tungsten-arc processes. (K1d, K9r, S13e; Ti-b, 9-72)

339-K.* Spot Welding of Rail Steel. D. Canonico and H. Schwartzbart. *Welding Journal,* v. 37, May 1958, p. 484-488.

Results of survey of companies spot welding reroll rail steel to mild steel in the manufacture of their various products. Data on successfully used welding procedures. Three companies utilized pulsation welding to reduce severity of quench of the weldment. One company made no provision for slow cooling. (K3n; CN-g, CN-p, 4-57)

340-K.* A Study of Factors Affecting the Strength and Ductility of Weld Metal. C. M. Wayman and R. D. Stout. *Welding Journal,* v. 37, May 1958, p. 193s-200s.

Effect of welding variables on mechanical properties of submerged-arc and inert-gas metal-arc welds in ingot iron, ASTM A212, and eutectoid steel. Variation in weld metal properties with preheating, travel speeds, welding current, number of passes, energy input, cooling rate, heat treatment including annealing, normalizing, austenitizing, quenching and stress-relieving. Influence of base metal composition, restraint on weld metal and prestrain of weld metal on tensile properties. 65 ref.
(K1d, K1e; CN-b, 2-64)

341-K.* The Effects of Porosity on Mild-Steel Welds. William L. Green, Mahmoud F. Hamad and Roy B. McCauley. *Welding Journal,* v. 37, May 1958, p. 206s-209s.

Tensile bending and impact test used to measure effects of porosity on mechanical properties of welds made by submerged-arc and inert-gas metal-arc processes in AISI 1020 steel. Welds were inspected with

X-ray. Results show that cross section of welds tested could be reduced by porosity up to about 7% without materially changing the mechanical properties.
(K1d, K1e, K9r, 9-68; CN)

342-K.* Cooling Rates and Peak Temperatures in Fusion Welding. Clyde M. Adams, Jr. *Welding Journal,* v. 37, May 1958, p. 210s-215s.

Derived relationships giving peak temperatures and centerline cooling rates directly as functions of geometric, thermal and welding variables. Expressions are close approximations derived from published temperature equation, usually active to within 5% and in accord with experimental findings. Factors determining whether heat flow is two or three-dimensional. 8 ref.
(K1, K2, K9n, 2-61; ST, Al, 4-53)

343-K. Behavior of Welded Corner Connections. John W. Fisher, George C. Driscoll, Jr., and F. W. Schutz, Jr. *Welding Journal,* v. 37, May 1958, p. 216s-232s.

Tests on straight-corner connections for welded ridged portal frames. Connections proportioned using concepts of plastic analysis. Effect of member size on connections fabricated of large rolled steel sections. 9 ref.
(K9r, 3-73, 4-57, 7-51, 17-51; ST)

344-K.* High-Temperature Vacuum Brazing of Jet-Engine Materials. E. G. Huschke, Jr., and G. S. Hoppin. *Welding Journal,* v. 37, May 1957, p. 233s-240s.

Vacuum requirements for brazing; gas evolution of materials in vacuum; strength of vacuum brazed versus hydrogen brazed joint and alternate methods to vacuum brazing for representative superalloy containing small amounts of Ti and Al which form heavy nonreducible oxide films during hydrogen brazing. 6 ref. (K8j, 1-73, SGA-h, Co, Al, Fe, Ni, Ti)

345-K. (Dutch.) **Welding of Metal Plate Laminated With PVC Foil (Marvi-Bond).** M. Doucet. *Plastica,* v. 11, Mar. 1958, p. 178-181.

(K1; Al-b, ST, 7-59)

346-K. (German.) **Weldability of Steels for Engineering Structures.** K. L. Zeyen. *Der Bauingenieur,* v. 32, 1957, p. 209-217, 420-428.

Weldability, welding suitability and welding safety. Proposals for the systematic classification of weldability specimens. Tests for determination of weldability with reference to choice of materials. Notch-resistant weld beads for preventing the propagation of brittle cracking. 96 ref. (K9r, K9s, ST)

347-K. Multiple Arc Multipies Welding Speed. *American Machinist,* v. 106, June 16, 1958, p. 108-109.

(K1e)

348-K. Aluminum Waveguide, Weld or Braze? L. Virgile and J. Difazio. *Electronic Industries,* v. 17, Apr. 1958, p. 90-94.

(K8, K3; Al, Ti)

349-K. Automatic Brazing Speeds Making of Coils for Carrier Corp. Harry E. Miller. *Industrial Gas,* v. 36, Apr. 1958, p. 6-8.

(K8, T1b)

350-K.* New Vistas for Vinyl-Metal Laminates. R. P. Hooker. *Machinery,* v. 64, June 1958, p. 99-103.

The laminates can be deep drawn, sheared, crimped, bent, punched and drilled. Thickness ranges from 0.004 to 0.02 in. Steel, aluminum or magnesium, 0.015 to 0.060 in. thick, form the backing. Preparing the backing and applying the vinyl; projection-welding technique employing magnetic force.
(K11d; ST, Al, Mg)

351-K. Preliminary Investigation of the Tensile Properties of Beryllium Couplings. J. Greenspan. Nuclear Metals, Inc. U. S. Atomic Energy Commission, NMI-1196, Dec. 11, 1957, 29 p. (Order from Office of Technical Services, Washington, D. C.) $.75.

Couplings include Be to Be, to Type 316 stainless, and to 2S aluminum. Beryllium in bolted or riveted joints was capable of considerable plastic deformation before fracture, but in brazed joints it was not. Beryllium as part of a threaded couple has good tensile strength, but little ductility. 6 ref.
(K13; T27; Be; SS, Al)

352-K.* Fusion Welding of Titanium. C. A. Terry and E. A. Taylor. *Welding and Metal Fabrication,* v. 26, June 1958, p. 198-205.

Techniques used to make butt, billet, corner and lap welds in commercially pure Ti sheet from 0.028 to 0.125 in. thick.
(K-general; Ti-a, 4-53)

353-K. Electronic Welding of Metals. J. A. Stohr. Paper from "Fuel

Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 9-17.

It is possible to produce an impact area of fixed dimensions on an object placed in the path of an electron beam. On that area an amount of energy would be dissipated, depending on the number of electrons (current intensity) and their acceleration potential. Localization of the energy and the use of a vacuum account for improvements in welds not obtainable by other methods. Remarkable results obtained on refractory metals (W, Mo and Ta) or easily oxidizable metals (Zr, Be and U). (K6)

354-K. Mechanism of Formation of Intercrystalline Cracks in the Heat Affected Zone in Fusion Welding. B. I. Medovar. *Soviet Physics, Technical Physics,* v. 2, (1957), p. 1454-1457. (Translated by American Institute of Physics, Inc.)

Argues that there is a direct link between the composition of the molten weld metal and the appearance of cracks in the heat-affected zone of the solid base metal. 5 ref. (K9, 9-72; ST)

355-K.* (German.) **Oxy-Acetylene Welding of Cast Iron.** Hans Reininger. *Giesserei-Praxis,* v. 76, Mar. 25, 1958, p. 101-104.

Repair for welding minor defects. For best results preheating is essential, but care should be taken to avoid structural changes and deterioration of mechanical properties due to heating. Composition of the material, design, shape or dimension of the object are important factors. (K2h, 18-72; CI)

356-K. Can Preheat Replace Stress Relief? H. Thomasson. *Canadian Metalworking,* v. 21, May 1958, p. 34-36.

Compares effects of preheating and stress-relief on properties of weldment. (K9p, K9q, J1a; 7-51)

357-K. Adhesive Bonding of Titanium Alloy. *Mechanical World and Engineering Record,* v. 138, June 1958, p. 277-278.

Procedures at Boeing Airplane Co. for bonding 6Al-4V Ti alloy to stainless steel honeycomb cores. (K12; Ti, SS, 7-59)

358-K. Adhesive Bonding. Arnold Ruskin. *Michigan Technic,* v. 76, Feb. 1958, p. 28-30, 48, 52.

Review of bonding techniques and materials. 24 ref. (K12)

359-K. Welding Aluminum and Its Alloys to Nuclear Standards. N. T. Burgess. *Nuclear Power,* v. 3, May 1958, p. 215-216.

The argon-arc process using a tungsten electrode is most adaptable, being used over a range of thicknesses, automatically or manually, with or without filler rod. (K1d, T11; Al)

360-K. Welding Magnesium Alloys. I. H. Morrison and A. F. Taylor. *Nuclear Power,* v. 3, May 1958, p. 217-218.

Argon-arc welding of Mg alloy cans for the Calder Hall reactor. (K1d, T11g; Mg-b)

361-K. Welding Techniques for the Rarer Metals. D. R. Harries and J. G. Purchas. *Nuclear Power,* v. 3, May 1958, p. 219-221.

Properties and optimum methods of welding zirconium, columbium, beryllium and uranium. 19 ref. (K-general, Zr, Cb, Be, U)

362-K. Corrosion and Heat Resisting Steel Fabrication. J. A. McWilliam. *Nuclear Power,* v. 3, May 1958, p. 222-223.

Welding of Cr-Ni steels. (K-general; SS)

363-K.* Vacuum Welding by Electron Beam. J. A. Stohr. *Nuclear Power,* v. 3, June 1958, p. 272-274.

Welding Zr, Al and other materials by means of a tungsten filament electron gun, which projects into a vacuum chamber. A thyratron controller chopper provides for intermittent cutting of the beam in case of strongly vaporizing metals. (K6, 1-73; Zr, Al)

364-K. Welding Copper-Base Alloy Tubes. J. F. Sebald and L. H. Hawthorne. *Power,* June 1958, p. 108-111, 208-214, 218.

(K-general; 4-60; Cu)

365-K. European Solder Developments. M. Reininger. *Product Engineering,* v. 29, June 23, 1958, p. 97, 99. (From *Maschinenmarkt,* no. 92, Nov. 15, 1957.)

A survey of new solders and techniques. (K7; SGA-f)

366-K.* Welding Corrosion Resisting Steels of the 18-8 Cr-Ni Type and Heat Resisting Steels. F. A. Ball. *Sheet Metal Industries,* v. 35, June 1958, p. 439-452.

The background of weld decay and the limitations of the methods developed for its prevention from

metallurgical viewpoint. Procedures for oxy-acetylene welding. 23 ref. (K2h, R-general; SS, 7-51)

367-K. Brazing Filler Metals for High-Temperature Service. A. M. Setapen. *Tool Engineer,* v. 40, June 1958, p. 119-120.

(K8; SGA-f)

368-K.* Titanium Welding Techniques. Titanium Engineering Bulletin No. 6. Titanium Metals Corp. of America, 1958, 31 p.

Welding equipment, shielding arrangement, joint design, preparation and fit-up and recommended weld setting for both inert-gas-shielded metal-arc and inert-gas-shielded tungsten-arc welding processes. Data on stress-relieving; evaluation of weld quality; problems of porosity and cracking; procedure in producing typical weldments; equipment and procedures for spot welding titanium; evaluation of spot weld quality. (K-general; Ti)

369-K. High-Temperature Adhesives. C. N. Powis. *Aircraft Production,* v. 20, Mar. 1958, p. 88-92.

Developments in metal-to-metal bonding for conditions of high-speed flight. (K12)

370-K. Cooperative Investigation of a New Welding Electrode for Stainless Steel. R. D. Wylie. *American Society of Mechanical Engineers,* Paper no. 58-MET-6, Apr. 1958, 8 p.

New welding procedure for use in high-temperature steam piping. 15 ref. (K1a, W13h; SS)

371-K. Welding Cast Components for Nuclear Power Application. W. H. Rice. *American Society of Mechanical Engineers,* Paper no. 58-MET-10, Apr. 1958, 8 p.

(K1d, T11; SS)

372-K. Fluxless Process Simplifies Aluminum Soldering. Samuel Freedman. *Aviation Age,* v. 28, Mar. 1958, p. 126-129.

Technique developed by Chemalloy-Electronics. (K7e; Al-b)

373-K. Spot Welding of Light Assemblies in Mild Steel. *British Standards Institution,* B.S. 1140, 1957, 10 p.

(K3h; ST)

374-K. Some Parameters Affecting Ceramic-to-Metal Seal Strength of a High Alumina Body. Sandford S. Cole, Jr., and Frank J. Hynes, Jr. *Ceramic Bulletin,* v. 37, 1958, p. 135-138.

(K11b)

375-K. Transparent Electrically Conductive Coating. E. R. Olson and E. H. Lougher. *Electrical Manufacturing,* v. 61, Mar. 1958, p. 143-145, 318, 320.

New procedure for depositing a highly transparent, electrically conductive coating that may be applied at low temperatures. 5 ref. (K11a)

376-K. Welding Joints in Steam Pipes. N. P. Pienaar. *Engineer and Foundryman,* v. 22, Jan. 1958, p. 47-52.

Reliability of welds made by the new E.B. shielded-arc process. (K1d, W13h; ST)

377-K. Effects of Oxidation on Adhesion of Polyethylene to Metals. Frank J. Bockoff, E. Timothy McDonel and John E. Rutzler, Jr. *Industrial and Engineering Chemistry,* v. 50, June 1958, p. 904-907.

Small degrees of oxidation can considerably improve adhesion values. (K11d)

378-K. Room Temperature-Cured Resorcinol Epoxide Adhesives for Metals. W. E. St. Clair and R. H. Moult. *Industrial and Engineering Chemistry,* v. 50, June 1958, p. 908-911.

9 ref. (K12; NM-d30)

379-K. Metal Surface Effects on Heat Resistance of Adhesive Bonds. J. M. Black and R. F. Blomquist. *Industrial and Engineering Chemistry,* v. 50, June 1958, p. 918-921.

Probable causes and mechanisms for the deterioration of adhesive bonds (phenol-epoxy type) in metal bonds at temperatures up to 550° F. 7 ref. (K12; NM-d30)

380-K. Adhesion Using Molecular Models. Adhesion of Polyethylene and Poly (Vinyl Chloride) to Metals. Dean Taylor, Jr., and John E. Rutzler, Jr. *Industrial and Engineering Chemistry,* v. 50, June 1958, p. 928-934.

Scale models of molecules of high polymers and metal surfaces—Ti, stainless steel and Fe—were prepared and fitted together and the adhesive force was calculated for various combinations. 30 ref. (K11d; Ti, SS, Fe)

381-K. Automatic Brazing in Production Line Speeds Coil Making. Harry E. Miller. *Industrial Heating,* v. 25, June 1958, p. 1144, 1146, 1148, 1150.

(K8; Cu, 4-53)

382-K. An Improved Method of Cleating. *Philips Technical Review,* v. 19, no. 9, 1957/1958, p. 268-269.

Cleat and tool designed in such a way as to result in a smaller tangential deformation. (K13)

383-K.* New Method for Bonding Polyethylene to Rubber, Brass, and Brass-Plated Metals. H. Peters and W. H. Lockwood. *Rubber World,* v. 138, June 1958, p. 418-423, 426.

A new bonding process, which utilizes partially hydrogenated polybutadiene, now makes possible the direct adhesion of polyethylene to rubber, brass or brass-plated metals. The method produces bonds with tensile strengths up to 1000 psi. and peel strengths from 60-100 psi. (K11d; Cu-n)

384-K. (German.) **General Survey of the Bonding of Metal.** Artur Pohl. *Deutsche Eisenbahn Technik,* no. 3, Mar. 1958, p. 102-106.

21 ref. (K11, K12)

385-K. (German.) **Vacuum Tight Metal-Ceramic Seals.** Karlernst Müller. *ETZ Elektrotechnische Zeitschrift,* no. 3, Mar. 21, 1958, p. 69-71.

14 ref. (K11b)

386-K. (German.) **Fluxing Material for Soldering of Aluminum and Its Alloys.** *Technik und Betrieb,* no. 4, Apr. 1958, p. 61.

(K7; Al, RM-q)

387-K.* Weldability and Notch Toughness. Pt. 1. K. Winterton. *Canadian Metalworking,* v. 21, June 1958, p. 40, 42, 44, 46, 48, 50.

Weld stresses in steel; analysis of defects such as hot cracks, weld-metal cracks, weld-metal fissuring and hardened zone cracks. Typical tests. (K9s; 9-72; ST)

388-K.* Fundamental Steel Metallurgy Applied to Welding. G. B. Craig. *Canadian Metalworking,* v. 21, June 1958, p. 52, 54, 56, 58, 60, 62.

Microstructural changes which occur during welding, effect of alloying elements and the generation of residual stresses can be understood by study of allotropic transformations in pure iron; iron-carbon phase diagram and iron-graphite equilibrium diagram; time-temperature-transformation curves; phase diagrams. (K9n, N8, N6p, Q25h; ST)

389-K.* (English.) **An X-Ray Investigation of Alloy Phases in Soldered Joints.** F. H. Scott. *Cahiers de Physique,* v. 11, Oct-Nov. 1957, p. 370-382.

Use of soldered joints for producing high constraints in ductile metals is found to be limited by alloying and diffusion between the solder and soldered metal. Fracture is found to take place in the intermediate phases of the equilibrium system which form in thin layers at the interface between solder and soldered metal. 7 ref. (K7)

390-K.* (German.) **Welding Method for Circular Seams on Large Pipes.** L. Hense and H. Scheruhn. *Schweissen und Schneiden,* v. 10, May 1958, p. 162-166.

Manual welding of circular seams; electrodes and welding duration; mechanical properties of seams; automatic welding of pipes using a magnetic jig; special electrodes; inspection. (K1; 4-60)

391-K.* (German.) **Study of Weldability of Flame Treated Surfaces.** Hans Schmidt. *Schweissen und Schneiden,* v. 10, May 1958, p. 167-173.

Results of X-ray examination, tensile and notch impact tests, hardness testing, macro and micro-examination of untreated and flame treated sheets. Conclusion was reached that surface protection remained after welding. (K9s, J2h)

392-K.* (German.) **Approximating Equilibirium Conditions in Molten Metal and Slag Pools in Electric Arc Welding. Alumina-Silica Flux as an Example.** William M. Conn. *Schweissen und Schneiden,* v. 10, May 1958, p. 174-180.

Similarity of processes in steelmaking and welding; preparation of welding fluxes for the system Al_2O_3-SiO_2; conditions of experiments with submerged arc welding and results. Considerations on liquidus temperature, formation of molten pools of metal and slag, travel of gas through pool and thermal conditions. (K1; RM-q)

393-K.* (German.) **Oxy-Acetylene Welding of Cast Iron.** Hans Reininger. *Giesserei-Praxis,* v. 76, Apr. 10, 1958, p. 120-123.

Use of welding rod of the approximate same composition as the base metal is suggested, with special attention to the Si content. High quality flux is advised to remove impurities and to prevent surface decarburization. Suitable rod compositions are given. (K2h, W29h)

394-K. How to Prevent Weld Failures in Nuclear Power Piping. V. T. Malcolm and Sidney Low. *Heating, Piping and Air Conditioning,* v. 30, July 1958, p. 106-108.

Welding fabrication techniques for heavy walled piping, with special emphasis on different backup techniques, the necessity of proving the integrity of the root pass, and the importance of heat treatment of welds. (K-general; SS-e, 4-60)

395-K. How Martin Seam Welds Honeycomb Cores. *Industry and Welding,* v. 31, Mar. 1958, p. 56-58.

(K3p, T24a, SS, Ti, Cu, Mo, 7-59)

396-K.* Welding Qualification and Component Performance. W. L. Fleischmann. Digest from "ASME-AWS Joint Metals Engineering Conference Paper 58-MET-8". *Mechanical Engineering,* v. 80, July 1958, p. 82.

Specific weld metallurgical problems as they pertain to the weld heat affected zone, weld deposit, joint design, weld quality and weld quality control. Attempts to show that component performance and weldability tests are interrelated and that, in the context of component performance, weldability tests assume the role of simulated service tests. (K9)

397-K.* Bonding Polyethylene to Rubber, Brass and Brass Plated Metals. H. Peters and W. H. Lockwood. *Plastics,* v. 23, June 1958, p. 228-231.

Bonding is now possible through the use of a cement based on partially hydrogenated polybutadiene known as Hydropol. The polymer, compounded with vulcanizing ingredients, is inserted between polyethylene and brass in the form of a thin film. Application of heat and pressure produces a strong vulcanized bond. (K12; Cu-n, NM-d31)

398-K.* Welding Corrosion-Resisting Steels of the 18/8 Cr/Ni Type and Heat-Resisting Steels. F. A. Ball. *Sheet Metal Industries,* v. 35, July 1958, p. 509-522.

Metallic arc, argon-arc, tungsten-arc, submerged arc and resistance welding of austenitic steels. Typical welding conditions and electrode specifications. 27 ref.
(K1a, K1d, K1e, K3; SS)

399-K. Heat Exchangers for Nuclear Power. *Welding and Metal Fabrication,* v. 26, July 1958, p. 234-238.

Welding processes and stress relief of 200-ton pressure vessels.
(W13b, K-general)

400-K. Cupro-Nickel Welded With Aluminum Bronze. Vincent Abaravich. *Welding Journal,* v. 37, Mar. 1958, p. 220-224.

Tests show inert-gas consumable-electrode process eliminates weld-deposit cracking.
(Kd, 9-72; CU-s, Al)

401-K. An Old Welding Process Cheats the Sea. L. L. Walker, Jr. *Welding Journal,* v. 37, Mar. 1958, p. 225-230.

Oxy-acetylene welding in the reconditioning and rebuilding of magnesium-bronze marine propellers.
(K2g, T22h, 17-72; Cu-s, Mg)

402-K.* Ultrasonic Welding of Structural Aluminum Alloys. J. Byron Jones and Florence R. Meyer. *Welding Journal,* v. 37, Mar. 1958, p. 81s-92s.

Ultrasonic spot and seam welding and their possibilities with the aircraft structural Al alloys. Tensile-shear and metallographic studies were made to determine the strength of the welds. Ultrasonics makes surface cleaning less critical and sometimes requires only degreasing. Supplemented with resistance heating, ultrasonic spot-type welders can cover a wider range of metal thickness. 4 ref.
(K3n, K3p, 1-74; Al-b)

403-K.* Energy Absorption Studies of Welds in Tempered Martensitic Base Metal. W. H. Bruckner and C. A. Robertson. *Welding Journal,* v. 37, Mar. 1958, p. 97s-100s.

Tempered-martensite base metal provides a larger energy-absorption potential than is available from conventional structural steel of rimmed or killed grades. Tests indicate that the heat affected zone of tempered-martensitic base metal is only slightly lower in energy absorption and ductility than the initial metal. The use of a welded crack stopper of this steel in a rimmed steel would arrest the propagation of a brittle crack since the energy absorbing capacity increases across the weld into the weld interface and into the martensitic base metal. (K9n; ST)

404-K.* Inert-Gas-Shielded Consumable-Electrode Welding of Molybdenum. N. E. Weare, R. E. Monroe and D. C. Martin. *Welding Journal,* v. 37, Mar. 1958, p. 117s-124s.

Arc stability and metal transfer are improved by using d-c, straight polarity, an electrode wire coated with a compound to increase the emission of electrons, and a helium shield. Same conditions produced best weld-bead contour, and lessened weld-metal cracking from shrinkage stresses developed in the weldment.

Porosity was eliminated by using either a leading-trailing shield or a dragging shield. Test results indicated that welding process may best be applied to weld thick Mo plate, whereas tungsten-arc welding would be better for welding sheet ⅛ in. thick or less. 7 ref.
(K1d, K1g; Mo, 4-53)

405-K.* Spot Welding of Inconel "X" in Thickness Range of 0.032 to 0.188 Inch. Jean Harris, M. D. Bellware and J. J. Riley. *Welding Journal,* v. 37, June 1958, p. 570-578.

Welding schedules for spot welding sheets of Inconel "X". Weld quality meets requirement of MIL-W-6858A specifications. Influence of thickness, welding and forging pressures, weld, quench and temperature times and welding current on weld strength and soundness. Results indicate satisfactory welds can be made on either single phase or three-phase equipment. 4 ref.
(K3n, 2-61, 3-74; Ni-b, 4-53)

406-K.* Porosity in Aluminum-Alloy Welds. F. R. Collins. *Welding Journal,* v. 37, June 1958, p. 589-593.

Effects of gas in Al plate, gas in electrode, shielding gas composition and welding conditions on porosity of welds made in Al using inert gas shielded consumable electrodes arc and inert gas shielded tungsten arc processes. Atmospheric contamination of shielded gas during welding was greatest source of porosity in inert gas shielded consumable welds. Excessive gas in plate or electrode contributed to porosity; however, commercial alloy did not contain sufficient gas to substantially effect porosity. Al-Mg alloys gave lower weld porosity than Al-Si alloys. 4 ref. (K9n; Al-b, 9-68)

407-K.* Electrode-Tip Life Studies in Series Spot Welding. E. F. Nipples, W. F. Savage, S. M. Robelotto and K. E. Dorschu. *Welding Journal,* v. 37, June 1958, p. 241s-248s.

Investigates the effect of electrode geometry, electrode material, electrode force and welding current on weld strength, weld diameter, weld consistency and electrode life for serious spot welds in as-received auto-body stock. Optimum welding condition for cold rolled rimmed steel body stock in pickled and lightly oiled condition of 0.036 to 0.039 in. thicknesses. Welding conditions which do not produce flashing provide more consistent welds than conditions which cause flashing. Consistency of welds made with 2 in. continuous radius dome electrode superior to those with 5/16 in. continuous radius dome electrodes.
(K3g, K9r, W29h; ST)

408-K.* Bonding of Cermet-Valve Components to Metals. G. M. Slaughter, P. Patriarca and W. D. Manly. *Welding Journal,* v. 37, June 1958, p. 249s-254s.

Technique and procedures for brazing cermets of the cemented carbide type of Inconel for high-temperature service. Cermets contained varying percentages of titanium carbide, tungsten carbide, tungsten-titanium complex carbide or columbium-tantalum-titanium complex carbide with Ni or Co as binding material; wetting tests with different brazing alloys; microstructure of bonds. Use of Ni for alloy cushions between cermet and Inconel to reduce effects of stresses resulting from differential thermal expansion; high-temperature direct bonding procedure for joining titanium carbide nickel cermets to Ni without brazing alloy. 8 ref. (K8; Ni-b, 6-70)

409-K.* The Arc Welding of Wrought Magnesium-Thorium Alloys. L. F. Lockwood and Paul Klain. *Welding Journal,* v. 37, June 1958, p. 255s-264s.

Results of welding evaluation tests on wrought Mg-base Th-containing alloys. HK31A, HM21XA, HM31XA. Tests with inert gas shielded tungsten arc process indicated alloys possessed excellent weldability and good short-time high-temperature properties after welding. Weld strength closely approached that of base metals at elevated temperatures. Creep resistance was not adversely effected by welding. Post weld heat treatments did not improve weld strength. Corrosion rates in 3% sodium chloride were not changed significantly by welding. EZ33A alloy found to be best rod composition for all alloys except certain applications at temperatures above 600° F. 4 ref. (K1d; Mg, Th)

410-K.* Chlorine Additions for High-Quality Inert-Gas Metal-Arc Welding of Aluminum Alloys. M. B. Kasen and A. R. Pfluger. *Welding Journal,* v. 37, June 1958, p. 269s-276s.

Introduction of small amounts of chlorine into arc area permits radiographically clear flat-position inert gas metal arc welds to be produced in Al alloys containing Mg despite presence of large amounts of gaseous contamination in the arc area. Chlorine introduced in torch contact tube at rate of 10 cubic

cm/mm. Effective in preventing porosity and removing dross resulting from oxygen, hydrogen, propane, water vapor hydrated oxide and welding wire contaminations. (K1d; Al, Mg, Cl)

411-K. (Czech.) **Welding Technique Development in USSR.** Julius Zeke. *Zvaranie,* v. 7, no. 5, May 1958, p. 129-135.

State of automatic welding in USSR as found on study tour of various plants and institutions. (K-general)

412-K.* (Czech.) **Investigation of Brazing and Soldering Properties of Fluxes.** Viliam Ruza. *Zvaranie,* v. 7, May 1958, p. 141-147.

Considers melting temperature, composition, material to be joined, chemical composition of brazing and soldering fluxes. Flux properties and effect of flux on capillary behavior, wetting power and other properties of brazing alloys; influence of flux on properties of the joint. (K7, K8; RM-q, SGA-f)

413-K. (Czech.) **Semi-Automatic Unit for Argon Shielded Welding.** Karel Rejchlik. *Zvaranie,* v. 7, May 1958, p. 148-150.

SAP 400 unit for argon shielded arc welding; operating data. (K1d)

414-K. (Czech.) **Automatic Welding.** Rudolf Krnak. *Zvaranie,* v. 7, May 1958, p. 150-153.

Equipment for increased productivity in submerged arc welding of heavy machinery parts. (K1e)

415-K.* (German.) **Metallurgical Problems of Welding Aluminum and Its Alloys With Special Reference to Shielded Arc Welding With Rare Gases.** W. Mantel and L. Wolff. *Aluminium,* v. 34, June 1958, p. 320-325.

Considers definition of weldability on basis of position of metal composition in relation to the eutectic; effect of parent and filler metal composition on intergranular weld cracking. Influence of certain impurities and grain refining addition on weldability of pure Al. Al and Al-Mg alloys welded by using filler rods of higher alloy element content. Effect of hydrogen, arc condition and metal constituents on porosity of Sigma welds. 5 ref. (K1d, Al-b)

416-K. (German.) **Use of Sigma Welding in Construction of Large Tanks.** *Aluminium,* v. 34, June 1958, p. 325-328.

(K1d, T26g; Al-b)

417-K.* (German.) **Influence of Surface Treatment on Bonded Metal Joints.** H. Peukert and O. Schwarz. *Aluminium,* v. 34, June 1958, p. 329-334.

Chemical pretreatment is preferred to mechanical roughening for surface treatment of Al alloys to be joined with adhesives. Practical importance of pickling process with aqueous solutions of sulphuric acid and sodium dichromate at 60° C. Tests made on steel-steel, copper-copper, brass-brass and mixed bonds to determine effect of surface pretreatment, pickling time, pickling temperature and pickling bath composition on the tension shearing strength of the joints. 6 ref. (K12, L12g; Al-b)

418-K.* **Brazing.** *Welding Engineer,* v. 43, Aug. 1958, p. 29-38.

Brazing processes, joint designs, fluxes and alloys; properties of Ag brazing alloys. (K8)

419-K.* **Selection, Welding of CrMo Alloy Steel Pipe. Pt. 2.** Jay Blend. *Welding Engineer,* v. 43, Aug. 1958, p. 42-44, 46.

Effect of preheat and postheat treatments on Cr-Mo alloy steels. (K1; AY-b, 4-60)

420-K.* (Italian.) **Autogenous Welding of Cast Iron Parts by Oxy-Acetylene Torch.** Bruno Lonati. *Fonderia,* v. 7, May 1958, p. 225-228.

Shop study of repair of defective castings in material of three different chemical analyses. Preheating practice, torch and flame characteristics, filler rods. Hardness and tension tests revealed similarity of repaired and originally sound areas; micro and macrographic tests revealed satisfactory results of repair work with techniques described. (K2h, 18-72; CI)

421-K.* **High Strength Weldable Steels.** K. J. Irvine. *Metallurgia,* v. 58, July 1958, p. 13-23.

Various ways in which steels can be strengthened and factors influencing weldability; advantages of bainitic structure. 24 ref. (K1, K9s; AY-n)

422-K.* (Czech.) **Decrease of Hardness of the Transition Zone in Welds of Low-Alloy Boiler Pipes.** Vladimir Smid and Roman Sejnoha. *Zvaranie,* v. 7, June 1958, p. 161-168.

Increased hardness of transition zone in welds of thin-walled pipe; progress of temperature in transition zone during welding; influence of time, temperature and extent of preheating. 5 ref.
(K9r, T26q; AY, 4-60)

423-K.* (Russian.) Study of Vibration Effect on Crystallization and Structure of Metal Welded by Flux-Bath Method. F. F. Benua, I. V. Vologdin and A. I. Katler. *Svarochnoe Proizvodstvo,* May 1958, p. 1-5.

Effect of low-frequency vibration (1500 to 2600 cycles per min.) on molten weld metal during period of crystallization. Structure is improved by breaking up large dendrites into smaller ones of varying orientation. Grain size is reduced and ductility improved. 12 ref. (K1e, K9)

424-K.* (Russian.) Some Metallurgical Problems in Welding Aluminum Alloys. A. A. Alov and V. M. Nikitin. *Svarochnoe Proizvodstvo,* June 1958, p. 28-30.

Three fluxes were tested for welding Al-Si—dextran, liquid glass and chlorite. Addition of small amount of chlorite solution to surface of alloy greatly strengthens its adhesion to filler material in seam. Use of sodium will strengthen welds of Al alloys containing $3NaF \cdot AlF_3$.
(K-general; Al-b, RM-q)

425-K. Effect of Composition of Iron-Chromium-Carbon Alloys on Weld Hot Cracking Susceptibility. I. K. Pokhodnya. *Avtomaticheskaya Svarka,* v. 9, no. 6, 1956, p. 55-63. (Henry Brutcher, Altadena, Calif., Translation no. 4168.)

Study of Fe-Cr-C alloys containing 0.1-2.5% C and 3-15% Cr. Effect of alloy content and form of eutectic on cracking susceptibility. Beneficial effect of large amounts of eutectic. Applicability of correlation between weld puddle composition and hot cracking resistance to deposition of high-carbon steels alloyed with large quantities of carbide-forming elements such as high speed steels, austenitic manganese steels.
(K9r; SS, 7-51, 9-72)

426-K. Furnace Brazing: Quality at Low Cost. H. M. Webber. *Industry and Welding,* v. 31, July 1958, p. 34-35.

Furnace brazing permits use of inexpensive stampings, screw-machine parts and pieces of tubing.
(K8j)

427-K. Combine Brazing and Hardening in One Operation. R. E. Wright. *Iron Age,* v. 182, July 31, 1958, p. 80-81.

By combining brazing and hardening steps into a single operation, production is speeded and costs are reduced at General Electric Co.
(K8j, J-general)

428-K. Automatic Welding Simplifies Design and Fabrication of High Pressure Cylinder. E. E. Martinac. *Modern Machine Shop,* v. 31, June 1958, p. 148-150.

A butt weld in a 4-in. thick steel cylinder fabricated in the maintenance shop of the Lincoln Electric Co. solved a design problem.
(K1e, 17-51; ST)

429-K. Investigation of Residual Stresses Resulting From Submerged Automatic Welding. L. A. Glikman and A. N. Babaev. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 31-37. (Henry Brutcher, Altadena, Calif., Translation no. 4221.)

In the surface layer of axial and tangential welding the residual stresses are in tension. They seem to be about 55 kg. per sq. mm. which roughly corresponds to the elastic limit of the fused metal. In the interior of the weld the stresses are considerably less. Maximum axial stresses are induced by parallel welding and minimum by circular. The greatest tangential stresses are produced by circular and the minimum by longitudinal welding. Preheating at 200° C. is helpful in keeping residual stresses down, but definite improvement is obtained by preheating to about 300° C.
(K1e, K9, Q25h; 7-51)

430-K. (German.) Weldability of Steels for Construction. K. L. Zeven. *Bauingenieur,* Nov. 1957, p. 420-428.

96 ref. (K9s; ST, SGB-s)

431-K. (German.) Adhesives for Metals. E. Pfeil. *Chemie für Labor und Betrieb,* Feb. 1958, p. 65-68.
(K12)

432-K. (German.) Adhesive Joining of Metals. P. Krekel. *Industrie-Anzeiger,* Apr. 25, 1958, p. 27-28.
14 ref. (K12)

433-K. (German.) Automatic Arc-Welding. E. Gatting. *Industrie-Anzeiger,* Apr. 25, 1958, p. 29-30.
(K1, 18-74)

434-K. (German.) Influence of Welding on Modern Design of Boilers and Chemical Equipment. H. Seifert.

Schweissen und Schneiden, v. 10, June 1958, p. 197-199.
(K-general, 17-51; T29, T26q)

435-K. (German.) **Combined Use of Steel and Copper in the Manufacture of Chemical Equipment.** R. Köcher. *Schweissen und Schneiden,* v. 10, June 1958, p. 206-209.
Welding of an evaporator from Cu-Ni-30Fe and boiler plate HII.
(K-general, T29; ST, Cu)

436-K. (German.) **Welded Chemical Equipment Made From Nickel and High-Nickel Alloys.** F. W. Strassburg. *Schweissen und Schneiden,* v. 10, June 1958, p. 209-212.
(K-general, T29; Ni)

437-K. (German.) **Welded Fittings Made From Stainless and Acid Resisting Steels.** F. Hüller. *Schweissen und Schneiden,* v. 10, June 1958, p. 213-214.
(K-general, T29; SS)

438-K. (German.) **High-Vacuum Tight Welding of Mercury Vapor Rectifiers.** Heinrich Bertels. *Schweissen und Schneiden,* v. 10, June 1958, p. 214-217.
(K3p, T1)

439-K. (German.) **Automatic Resistance Welding of a V-Belt Pulley.** A. Weis. *Schweissen und Schneiden,* v. 10, June 1958, p. 219-222.
(K3, T7k, 18-74)

440-K. (German.) **Welding in the Motor Car Industry.** E. Dengler. *Schweissen und Schneiden,* v. 10, June 1958, p. 222-223.
Influence of welding on design of the supporting structure.
(K-general, T21a)

441-K. (German.) **Semi-Automatic Welding of Longitudinal Seams for Fuel Tanks.** F. Ast. *Schweissen und Schneiden,* v. 10, June 1958, p. 224-226.
Automatic gas welding of thin sheet by interchangeable nozzles to suit the required heat (1.0 to 1.25-mm. sheet thickness); melting of the sheets is independent of melting rate of the filler wire; a gas welding machine described has proved economical for medium quantities. 19 ref. (K2, 1-52; 4-53)

442-K. (German.) **Pressure Gas Welding Process in Reinforced Concrete Construction.** P. Steidl. *Schweissen und Schneiden,* v. 10, June 1958, p. 242-244.
(K2k, T26n; ST)

443-K. (German.) **Welding of Nickel and Nickel Alloys.** *Technica,* Dec. 20, 1957, p. 1518-1520.
(K-general; Ni)

444-K. (German.) **Welding of Nickel and Nickel Alloys.** *Technica,* Jan. 3, 1958, p. 31-36.
(K-general; Ni)

445-K. (German.) **Techniques of Welding, Soldering and Die-Casting.** W. K. Sterling. *Technica,* Jan. 17, 1958, p. 45.
(K-general, K7, E13)

446-K. (German.) **Adhesive Joining of Metals.** Norman Adrian de Bruyne. *VDI-Berichte,* v. 28, 1958, p. 87-92.
3 ref. (K12)

447-K. (German.) **Characteristics of Metal Adhesive Joints.** Karl Wellinger and Ulrich Rembold. *VDI-Zeitschrift,* v. 100, Jan. 11, 1958, p. 41-46.
13 ref. (K12)

448-K. (Spanish.) **Welding in Nuclear Plants.** E. B. Lavelle. *Ciencia y Tecnica de la Soldadura,* v. 8, Mar-Apr. 1958, 10 p.
(K-general, T11)

449-K. Factors Affecting the Adhesion of Organics. Edmund Thelen. *American Chemical Society, Preprint* 18, Apr. 1958, p. 110-124.
Variables and their effect on strength and premanence of adhesive joints of metals and other solids. Effect of corrosion, surface preparation of metals. 13 ref. (K12)

450-K. Welding Research in the United Kingdom. A. A. Wells and P. T. Houldcroft. *Canadian Metalworking,* v. 21, June 1958, p. 62, 64, 66.
Activities of the British Welding Research Association.
(K-general, A9h)

451-K. Salt Bath Brazing. L. B. Rosseau. *Industrial Heating,* v. 25, July 1958, p. 1325-1334, 1346.
(K8n, SGA-f)

452-K. New Guide for Good Spotwelds. *Industry and Welding,* v. 31, Aug. 1958, p. 29, 45.
Oscilloscope-type instrument shows pressures and current in welding cycle. Photographic negative of a good weld is superimposed on scope. When weld being done matches pattern on negative, a good weld is assured. (K3n, X25j)

453-K. Spotwelding Titanium Is Practical. W. R. Gain. *Metalworking Production,* v. 102, June 6, 1958, p. 992-994.
Successful welds were made on 6Al-4V Ti alloy. (K3n; Ti-b)

454-K. Pipeline Welding. Pt. 1. Background. Richard D. Morel. *Pe-*

troleum Engineer, v. 30, Apr. 1958, p. D25-D40.

(K1d, T26r; ST)

455-K. (Czech.) **Effect of a Vibrating Electrode on Weld Porosity.** Pavel Hrbal. *Zvaranie,* v. 7, June 1958, p. 169-171.

Use of a holder with invariable frequency in electrode welding has no effect on porosity decrease in root welding in difficult positions. (K9r, K1, 9-68)

456-K. (Czech.) **Factors Involved in Argon Shielded Welding With Consumable Electrode.** Pavel Zuffa. *Zvaranie,* v. 7, June 1958, p. 179-180.

Dependence of current on rate of wire feeding; possibility of raising upper current limit; formula for approximate calculation of the welding current from wire feeding rate. (K1d, K9)

457-K. (Czech.) **Testing Soldering Qualities of Solders.** Viliam Ruza. *Zvaranie,* v. 7, June 1958, p. 181-183. 5 ref. (K7, K8; SGA-f)

458-K. (French.) **Vacuum Welding of Metals.** J. A. Stohr and J. Briola. *Soudage et Techniques Connexes,* v. 12, May-June 1958, p. 165-172.

Welding process recently developed by the Commissariat a l'Energie Atomique, in which use is made of the impact of an electron beam produced by an electron gun to melt the edges of the workpieces. Welding is carried out in a metal enclosure, in a vacuum of 10^{-4} to 10^{-6} mm. of mercury. Process makes it possible to weld highly oxidizable metals (e.g., Zr) or to fabricate high-vacuum-sealed metal containers. (K1d, 1-73)

459-K. (German.) **Inert-Gas-Shielded Arc Welding and Cutting of Aluminum.** W. Linieus. *Industrie-Anzeiger,* v. 80, June 27, 1958. p. 746-749. 8 ref. (K1d, G22h; Al-b)

460-K. (German.) **Soldering and Tinplating Gray Cast Iron Treated by Kolene Method.** Carl Albrecht. *Industrieblatt,* v. 58, May 1958, p. 197-199.

Application, technique, economy. (K7d, L16; CI-n, *Sn*)

461-K. (German.) **Preparation of Gray Cast Iron for Brazing.** K. Falkenmayer. *Konstruktion im Maschinen, Apparate und Gerätebau,* Apr. 1958, p. 151-155.

In the brazing of gray cast iron parts the graphite hinders the spreading of the solder. With the Electro-Kolene method the graphite is eleminated on the cast surface. 9 ref. (K8, L13)

462-K. (German.) **New Regulations for Welded Steel Building Constructions.** G. Bürgermeister and A. Neumann. *Schweissen und Schneiden,* v. 10, May 1958, p. 158-162.

(K-general, T26; ST)

463-K. (German.) **Welding Copper.** *Technik und Betrieb,* v. 10, June 1958, p. 89-90.

(K-general; Cu)

464-K. (Japanese.) **Welding and Brazing of Stainless Steel.** S. Hanabe. *Metals,* v. 28, June 1958, p. 429-433.

Problems with welding of stainless steel: embrittlement of the weld; occurrence of welding cracks and weld strength at high temperature; heat treatment of the weld; brazing of stainless steel. (K-general, K8; SS)

465-K. (Russian.) **Electrodes for Welding Austenitic Heat Resistant Pipe Steels.** B. I. Lazarev. *Svarochnoe Proizvodstvo,* May 1958, p. 8-11.

(K1, W29h; SS, 4-60)

466-K. (Russian.) **Modification of Fluxes by Metal and Mineral Additions.** M. R. Shraerman and S. B. Petelina. *Svarochnoe Proizvodstvo,* May 1958, p. 14-16.

(K9; RM-q, AD-q)

467-K. (Russian.) **Automatic Welding of Aluminum by Split Electrode.** F. S. Bugrii. *Svarochnoe Proizvodstvo,* May 1958, p. 27-29.

(K1, W29h; Al-b)

468-K. (Russian.) **Weldability of Heat Resistant Pearlite Steel Rotors.** M. Kh. Shorshorov and V. N. Matkhanov. *Svarochnoe Proizvodstvo,* June 1958, p. 18-23.

It is recommended that welding temperature be kept within range 660-680°. 5 ref. (K9s, ST, SGA-h)

469-K.* **A Photoelastic Technique for Strain Measurement on the Aluminum Alloy Surfaces.** H. Fessler and D. J. Haines. *British Journal of Applied Physics,* v. 9, July 1958, p. 282-287.

Technique for bonding layers of an epoxy resin on flat Al alloy surfaces. Joints which withstood more than 4% strain were obtained by carefully controlled preparation of the metal and the adhesive. Initial birefringence was avoided by curing the joint without external pressure and by slow cooling after finish curing at 65° C. Different types of reflection polariscopes; strain fringe values for reflecting layer

and adhesive estimated. (K11d; Al-b, NMd-30)

470-K.* **Some Applications of Cold Pressure-Welding.** *Machinery (London)*, v. 93, July 23, 1958, p. 207-213.

Preparation of the mating surfaces and of four different types of lap-welded joint, also of manually and pneumatically operated tools available for this process. (K6)

471-K.* (Russian.) **Effect of Welding Conditions on Hydrogen Content of Weld Metal.** R. A. Kozlov. *Svarochnoe Proizvodstvo*, Apr. 1958, p. 25-28.

Study of hydrogen in metal which causes cracks and other flows in welding process. In automatic welding, content of hydrogen in weld metal depends on welding procedure, type of current and grade of flux and temperature of annealing. In manual welding, the temperature for firing the electrode is basic factor influencing the lowering of hydrogen content in the fused metal. 5 ref. (K1, 2-61, 2-64; H, 7-51, 9-72)

472-K.* **New Concept Solves Aluminized Pipe Weld Problems.** Kenneth R. Notvest. *Petroleum Refiner*, v. 37, July 1958, p. 100-102.

Inert gas welding controlling the fusion of aluminized base metal with the filler metal to give an alloyed root pass, which is fused to the base metal coating, provides continuous protection from corrosion of Al. (K1e, 4-61, 8-74)

473-K.* (German.) **Experience With Argon Protected Sigma Hard Facing and in Carbon Dioxide Joint Welding.** R. Nass and E. Brammertz. *Werkstatt und Betrieb*, v. 91, June 1958, p. 297-305.

Apparatus, technique and results in facing sheet steel with Cu alloy under argon protection and in welding thick sheet under carbon dioxide protection. Acceptance testing in carbon dioxide sigma welding applied to boiler construction. Investigation on toxic effect of carbon dioxide. 4 ref. (K1d, L24; ST, 4-53)

474-K.* (German.) **Ultrasonic Welding.** W. Weber. *Werkstatt und Betrieb*, v. 91, June 1958, p. 305-310.

Principle; comparison with high pressure welding; best modern construction of weld units; controlled operation variables; recrystallization welding; mechanism of ultrasonic welding; thermal conditions in weld zone; properties of welded material; applications. 10 ref. (K6r)

475-K.* (German.) **Effect of Hydrogen in Steel Hardening and Welding.** K. L. Zeyen. *Werkstatt und Betrieb*, v. 91, June 1958, p. 310-320.

Effect of hydrogen in hardening and methods to measure it; effect of hydrogen in welding; effect of humidity of electrode coats and of welding method. Recent publications on basic coated electrodes and advantages of the latter. 100 ref. (K1, ST; 9-72, 10-54)

476-K.* (German.) **New Method of Arc Butt Welding of Rails.** Ott and Krause. *Schweisstechnik*, v. 12, May 1958, p. 51-58.

Development and technique of method; quality of weld; economical advantages; testing and mechanical properties of weld. (K1, T23q)

477-K. **Grit and Shot-Reinforced High-Tensile Bolted Joints.** R. L. Sanks and C. C. Rampton, Jr. *American Society of Civil Engineers, Proceedings*, v. 83, Nov. 1957, 32 p. (National Advisory Committee for Aeronautics Technical Note 1435.)

Paint in high tensile bolted joints drastically reduces frictional resistance to slip. Shot-reinforced painted joints are, in static tests, equal to or somewhat better than clean mill-scale joints, and much superior to riveted joints. (K13p)

478-K. **High-Temperature Corrosion-Resistance Brazing.** John V. Long and George D. Cremer. *Astronautics*, v. 3, Aug. 1958, p. 28-29.

(K8)

479-K. **Soldering in the Space Age.** Alvin B. Kaufman. *Instruments and Automation*, v. 32, July 1958, p. 1202-1203.

Factors governing joint strength. (K7)

480-K. **Electrical Resistance Welding.** D. S. Faulkner. *Wire Industry*, v. 25, July 1958, p. 643-645, 647-648.

Problems associated with continuous wire drawing, especially the flash welding and butt welding of rods to be drawn. Proposal for automated wire drawing factory. (K3r, W28h; 4-55, 4-61)

481-K. (German.) **Welding in Steel-Casting Foundries.** Otto Bergmann and Helmut Reichert. *Giessereitechnik*, v. 4, May 1958, p. 110-111.

(K-general, W19; ST, 5-60)

482-K. (German.) **Status of the Technology of Arc Welding Steel.** Theodor Ricken. *Industrieblatt*, v. 58, June 25, 1958, p. 246-250.

Submerged arc, inert arc and electroslag welding. 4 ref. (K-general)

483-K. (German.) **Metallurgical Requirements for Welding Clad Steel Plates.** W. Rädeker. *Schweissen und Schneiden,* v. 10, July 1958, p. 255-259.

Improving resistance against transcrystalline cracking in the welds; heat treatment of welds.
(K9, J-general; ST, 7-51, 8-66, 9-72)

484-K. (German.) **Selected Examples of Welded Structures in Chemical Engineering.** Rudolf Söhngen. *Schweissen und Schneiden,* v. 10, July 1958, p. 260-265.

Influence of welding upon design of plant and equipment; properties and position of the welded seam; design elements; examples in steel, copper and alloys.
(K-general, T29, 17-51; ST, Cu)

485-K. (German.) **Welding in Apparatus Construction for the Chemical Industry.** P. Richter. *Schweissen und Schneiden,* v. 10, July 1958, p. 265-269.

Design; welding pipes; welded boiler connections; hard facing of small parts; re-inforcement welding on vessels.
(K-general, T29, T26r, T26q, 17-51)

486-K. (German.) **Design of Welded Vessels for High Pressures and Temperatures.** A. F. Maier. *Schweissen und Schneiden,* v. 10, July 1958, p. 270-276.

Stress of walls; deformation as a function of distribution of stress; multilayer hollow bodies; mechanics of the casing tubes. 12 ref.
(K-general, T29; ST, 4-60)

487-K. (German.) **Welding of Pressure Vessel Steels in Heavy Sections by the Electro-Slag Process.** W. Anders. *Schweisstechnik,* v. 12, June 1958, p. 65-70.

9 ref. (K1d, K3p, T26q; ST)

488-K. (German.) **Welding of Alloy-Steels in the Chemical Industry Without Pre-Heating.** Werner Gilde. *Schweisstechnik,* v. 12, June 1958, p. 84-87.

Slow cooling to hold the temperature of the weld zone for a brief time at the solidification temperature. 8 ref. (K9q, K9r; ST)

489-K. (German.) **Automatic Submerged-Arc Welding of Thin Plates.** Horst Buszka. *Schweisstechnik,* v. 12, June 1958, p. 87-91.

Mechanical properties of joints; description of equipment.
(K1e, 3-73, 18-74; ST, 4-5)

490-K. (Russian.) **Stresses in Thin Sheet Elements in Welding and How to Avoid Them.** S. A. Kurkin and V. A. Vinokurov. *Svarochnoe Proizvodstvo,* Apr. 1958, p. 28-31.

Recommends rolling of ring-shaped seams and pressure on spots in spot welding to eliminate stresses. 5 ref.
(K3n, Q25h, 3-74, 17-51; 4-53, 7-51)

491-K. Report on Adhesive Bonding of Titanium. H. E. Pattee, G. E. Faulkner and P. J. Rieppel. *Battelle Memorial Institute, TML Report no. 104,* 1958, 28 p.

Considers metal-to-metal adhesive bonding and its applications. Adhesives, surface treatments, production consideration and evaluation of bonded structures. 85 ref. (K12)

492-K.* High Quality Fusion Welding of Aluminum. T. B. Correy. *Light Metal Age,* v. 16, June 1958, p. 8-12.

Methods for arc welding Al. A thin section of annealed 1100 alloy (2-S), Alcoa A-13 alloy braze, and a thick section of annealed 1100 alloy were fusion welded by a capacitor balanced inert-gas shielded, tungsten electrode, alternating current arc process. Result was a weld of laboratory quality with smooth, shiny surface, devoid of porosities, pipes and inclusions, highly corrosion resistant and water-tight, with uniform cross section and penetration. (K1; W29d; Al)

493-K.* The Meaning of Weldability. T. B. Jefferson. *Welding Engineer,* v. 43, Mid-June, 1958, p. 5-20.

Weldability and data on chemical composition, mechanical properties, physical properties of low, medium and high-carbon steels, low-alloy high-sulphur steels, low-alloy Mn steels, low-alloy Ni steels, low-alloy Ni-Cr steels, low-alloy Mo steels, low-alloy Cr steel, low-alloy high-tensile steel, austenitic stainless steels, martensitic stainless steels, ferritic stainless steel, austenitic Mn steel. Al, Al alloys, Mg, Mg alloys, Cu, brasses, bronze, Cu-Si, Cu-Ni, aluminum bronze, B-Cu, phosphorus bronze, Ni and Ni alloys. (K9s; CN-g, CNr, AY, b, SS, Al, Mg, Cu, Ni)

494-K.* Welding Titanium. Karl Bungardt and Klaus Rudinger. *Metal Progress,* v. 74 July 1958, p. 184-185. Digest of "A Contribution to the Problem of Welding Titanium Alloys". ("Zeitschrift für Metallkunde", v. 47, Aug. 1956, p. 585-593.)

A post weld anneal is recommended for all alloys (1 hr. at 1290° F.) to reduce residual stresses and improve notch toughness. Section thickness of the weldment affects the length of time required at the temperature. Weldments made up of both alpha and alpha + beta Ti alloys exhibit superior properties. (K-general, J1a; Ti-b)

495-K.* Cyclic Strength Tests on Solders. Influence of Cerium. *Tin and Its Uses,* no. 42, Spring 1958, p. 14-16.

Cyclic loading at 250° F. of joints soldered with 70Sn-30Pb and 30Sn-70Pb solders containing up to 0.50% cerium demonstrated marked superiority of the high tin solder and further improvement of performance of the high tin solder with addition of cerium. (K7; Sn, Pb, Ce)

496-K.* Inert-Gas Tungsten-Arc Welding of Titanium for Nuclear and Chemical Industries. G. M. Adamson and W. J. Leonard. *Welding Journal,* v. 37, July 1958, p. 673-682.

Process by which unalloyed Ti may be field welded using only conventional inert-gas tungsten-arc equipment. The process is applicable to the high-quality individual welds required in field welding for the chemical industry rather than to high-speed repetitive production welds. (K1d, T29; Ti)

497-K.* Fundamentals of Brazing for Elevated-Temperature Service. M. D. Bellware. *Welding Journal,* v. 37, July 1958, p. 683-691.

Classifications of the brazing alloys considered are silver-base, copper-base, manganese, gold and palladium-base and nickel-base. For service temperatures above about 1000° F., Ni-base brazing alloys have produced the best results. When brazing alloys in the form of fine powder are used, they are often mixed with a suitable vehicle such as acrylic-resin or methyl-cellulose. These binders leave practically no residue after brazing. 9 ref. (K8, 2-62; Ag, Cu, Mn, Au, Pd, Ni)

498-K.* Prediction of Weld Heat-Affected Zone Microstructures From Continuous-Cooling Transformation Data. E. F. Nippes and E. C. Nelson. *Welding Journal,* v. 37, July 1958, p. 289s-294s.

A system of predicting the microstructures of the heat affected zones of welds from continuous cooling transformation data and weld thermal cycles. Microstructures of experimental welds are compared with the predicted microstructures, and the system of calculations and its experimental foundations are analyzed to explain the differences between theory and actual welds. 6 ref. (K9, M27)

499-K* Welding Metallurgy of Cr-Mo-V Steels for High-Temperature Steam-Turbine Components. R. J. Christoffel, R. M. Curran, F. H. Domina and C. H. Soldan. *We'ding Journal,* v. 37, July 1958, p. 295s-303s.

Summary of preheat and post-weld heat treatments developed for welding Cr-Mo-V base metal with a ½% Cr-1% Mo electrode using both the manual metal-arc and submerged-arc processes. Rupture strength of the ½% Cr-1% Mo weld metal was evaluated and found to be less than that of the base metal. The effect of composition and heat treatment on the rupture strength of low-alloy steel weld metals was evaluated. 7 ref. (K1, W11k, J1a; ST, Cr, Mo, V)

500-K.* Fabrication and Service Factors Involved in Failure of Welded Steam Receivers. A. J. Babecki and P. P. Puzak. *Welding Journal,* v. 37, July 1958, p. 320s-325s.

Base-metal cracking in the vicinity of the nozzle and manhole reinforcement pads was discovered in 65-in. diameter catapult steam receivers aboard naval aircraft carriers after 1 to 1½ yrs. of service. Fabrication defects in the form of porosity, undercutting and poor fit-up were found in all three receiver sections. Typical fatigue-type markings of crack propagation were found on the crack surfaces emenating from weld-metal porosity. (K9, 9-68, 9-72)

501-K.* Low Crack Sensitivity of Steel Joint Welded by CO_2-O_2 Arc Welding. H. Sekiguchi and I. Masumoto. *Welding Journal,* v. 37, July 1958, p. 326s-336s.

A mixed gas of carbon dioxide and oxygen is supplied around the arc and molten pool and a bare steel wire containing suitable quantities of deoxidizers is used as a metal electrode. Results of measurements on hydrogen contents and crack sensitivities of steel joints are given. Hydrogen content of the weld is very low in comparison with those by other processes. 10 ref. (K1d; ST)

502-K.* Joining Problems Aired. J. L. McCloud. *Metal Progress,* v. 74, July 1958, p. 93-96.

Serviced requirements for metal assemblies used in jet and rocket engines and in atomic applications are becoming more stringent. This has focused attention on improved methods for brazing and welding metals for high-temperature service. (K-general)

503-K.* Role of Phosphorus in Austenitic Manganese Weld Metal. W. T. Delong, W. L. Lutes and H. F. Reid. *Welding Journal,* v. 37, July 1958, p. 316s-319s.

Nickel-manganese weld metals with reduced phosphorus contents in the range 0.01 to 0.02% had outstanding tensile strength, ductility and crack resistance. Phosphorus contents of about 0.035% appeared the maximum that could be tolerated without impairment of the properties of the weld deposit. General response of Mo-Mn weld metals to reduction of phosphorus content paralleled those observed in Ni-Mn weld metals. 7 ref. (K9, 2-60; SS, *P, Ni, Mn*)

504-K. Development of Oxidation and Liquid Sodium Resistant Brazing Alloys. D. A. Canonico and H. Schwartzbart. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131745, Mar. 1958, 44 p. $1.25.

Development of filler metals for brazing Type 310 stainless steel to Inconel, resistant to oxidation and attack by molten sodium at 1650° F. (K8; SGA-f, Fe-b, Cr-b, Ni-b, SS)

505-K. The Production Man's Guide to Adhesive Bonding Methods. John P. Wright. *Metalworking Production,* v. 102, Aug. 1, 1958, p. 1352-1358. (K12, K11)

506-K. Arc Versus Gas Welding on Gray Cast Iron—Which Should It Be? Jose Carlos Pellegrino. *Welding Engineer,* v. 42, July 1958, p. 48. (K1a, K2g; CI-n)

507-K. Selection, Welding of CrMo Alloy Steel Pipe. Jay Bland. *Welding Engineer,* v. 43, July 1958, p. 34-36. (K1, 4-60; AY, *Cr, Mo*)

508-K. Welding and Stainless Maintain Water Turbines. Lloyd McWilliams. *Welding Engineer,* v. 43, July 1958, p. 38-40. (K1, T7h; SS)

509-K. Improving the Fatigue Life of Spot Welds. *Welding Journal,* v. 37, July 1958, p. 315s-336s.

Increase of fatigue life through stress distribution in hydrodynamically compressed spot welds. (K3n, Q7)

510-K. How Good Is Your Welder Power Supply? A. C. Johnson and F. E. Donathan. *Welding Journal,* v. 37, July 1958, p. 692-699.

Simple electronic counter developed to indicate the frequency with which excessive voltage drops occur. (K-general, W29a)

511-K. Design Tips for Dry Hydrogen Brazed Parts. H. Lewis. *Western Metalworking,* v. 16, June 1958, p. 23-26. (K8, K6q, SGA-f, 17-51)

512-K. (German.) **Wiping Solder in Manufacture of Motor Car Bodies and in Cable Joining.** H. Johnen. *Schweissen und Schneiden,* v. 10, July 1958, p. 281-283.

Wiping operation; determination of wiping temperature and properties; suitable solders. (K7a, T21a, T1b; SGA-f)

513-K. Improvement of Quality of Weld Metal. A. A. Alov and V. S. Vinogradov. *Svarochnoe Proizvodstvo,* July 1957, p. 9-10. (Henry Brutcher, Altadena, Calif., Translation no 4116.)

Effect of transverse electrode vibration during welding (submerged arc) on the impact strength of the weld metal. (K1e, K9r)

514-K.* Helpful Hints for Successful Brazing. Orland Jack. *Carbide Engineering,* Aug. 1958, p. 9-12.

Brazing techniques for carbide tool tips; cleanliness, care, accuracy essential for successful joints. (K8, T6n; 6-69)

515-K.* Industrial Applications of Magnetic-Flux Gas-Shielded Arc Welding. R. T. Telford and F. T. Stanchus. *Welding Journal,* v. 37, Aug. 1958, p. 771-778.

Process has several advantages compared to covered-electrode welding: up to an 80% reduction in costs; up to a 400% increase in welding speeds; excellent weld quality, mechanical properties, appearance and lack of undercutting. Use of magnetic-flux welding for root and backing passes as preparation for submerged-arc welding improves weld quality and cuts costs. (K1d, K1e)

516-K.* Inert-Gas-Shielded Arc Welding of Silicon and Aluminum

Bronze. Paul L. Hemmes. *Welding Journal,* v. 37, Aug. 1958, p. 779-788.

Joint design, welding procedures, shielding gas, operational techniques and mechanical strength of welded joints. In most applications the inert-gas-shielded arc-welding processes are most efficient for welding both silicon and aluminum bronze. (K1d; Cu-n, *Si, Al*)

517-K.* Casting Weldments in a Petroleum Refinery. J. Bland, C. B. Parrish and R. C. Wheeler. *Welding Journal,* v. 37, Aug. 1958, p. 789-798.

Weldability characteristics of low and intermediate Cr-Mo alloy steels. Castings which meet specification requirements for chemistry and tensile properties, in addition to being virtually free from casting defects, are satisfactory components of petroleum refining equipment and process lines. Typical examples of repair and maintenance. (K9s, T29n, 17-57; AY, 5-60)

518-K.* Diffusion Bonding Below 1000° F. J. T. Niemann, R. P. Sopher and P. J. Rieppel. *Welding Journal,* v. 37, Aug. 1958, p. 337s-342s.

Diffusion-bonding techniques for joining Be-Cu and Monel. Good joints were obtained with Au-Cu, Au-Ag, Au-Pb and Au-Al combinations. From the standpoint of strength, Au-Cu and Au-Ag were comparable (13,000 psi. shear) and superior to the Au-Pb and Au-Al combinations which were found to be quite brittle. 5 ref. (K5k; Cu-b, Ni-b, SGA-f)

519-K.* Control of Melting Rate and Metal Transfer in Gas-Shielded Metal-Arc Welding. Pt. 1. Control of Electrode Melting Rate. A. Lesnewich. *Welding Journal,* v. 37, Aug. 1958, p. 343s-353s.

Melting rates of electrodes having a fixed composition using the gas-shielded metal arc with reverse-polarity direct current are dependent only upon the welding current, electrode extension and electrode diameter. Heat for electrode melting is developed by anode or cathode reactions and electrical-resistance heating. Very little, if any, heat is due to radiation from the weld pool or the arc stream. 9 ref. (K1d, K9n)

520-K.* The Control of Porosity in High-Nickel Alloy Welds. G. R. Pease, R. E. Brien and P. E. Legrand. *Welding Journal,* v. 37, Aug. 1958, p. 354s-360s.

Tests were conducted to establish what gases will cause porosity and in what amounts they are damaging. Nitrogen was found to be extremely damaging to the weld soundness of Cr-free alloys; oxygen, carbon monoxide and carbon dioxide were less so and hydrogen was relatively innocuous. Cr-containing alloys were more resistant to damaging effects by all the gases. The addition of Ti and other gas-fixing elements to the weld deposit increases the breadth of the welding conditions under which porosity-free welds can be prepared. 17 ref. (K9r, 9-68; Ni-b)

521-K.* The Effect of Welding Speed on Strength of 6061-T4 Aluminum Joints. William L. Burch. *Welding Journal,* v. 37, Aug. 1958, p. 361s-367s.

6061-T4 aluminum joints could be welded by the inert-gas-shielded tungsten arc process, which upon aging had nearly the strength of 6061-T6. Welding speed was the most important of the many factors affecting response to aging. Slow speeds caused high heat input, practically annealing the base metal. With increasing speeds the joint strength increased rapidly up to a speed of 15 in. per min. above which the tensile strength was uniformly high at 90-95% of T-6 strength. 5 ref. (K1d, Q27d; Al-b)

522-K.* (French.) **Use of Gas for Brazing.** *Pratique des Industries Mecaniques,* v. 41, Apr. 1958, p. 92-95.

Gas brazing techniques and equipment. (K8g, 1-52)

523-K.* (Russian.) **Electrode Wires for Welding in Carbon Dioxide Gas.** N. M. Novozhilov and A. M. Sokolova. *Svarochnoe Proizvodstvo,* July 1958, p. 10-14.

For welding low-carbon steels in CO_2 gas it is recommended that electrode wires contain Si and Mn as deoxidizers. For welding of rimming and killed low-carbon steels at 500 amp. the electrode wires should contain 0.05-0.12% C, 0.6-1.0% Si and 1.4-2.4% Mn. This composition can also be used for other low-carbon steels. Addition of Cr, Ni, Mo and Cu will produce welds of many different properties. 13 ref. (K1, W29h; CN, ST-c, ST-d)

524-K.* (Russian.) **Strength of Various Types of Titanium Welds.** F. E. Tret'yakov and G. E. Kainova. *Svarochnoe Proizvodstvo,* July 1958, p. 19-23.

The wear resistance of spot and roll welds subjected to high-frequency stress is very low. The strength of spot and roll welds subjected to cyclical stress at a raised temperature declines more slowly than that of the base metal. The strength of two-layer spot welds is much greater than that of single layer welds under static stress and low-frequency cyclical stress. (K9r, Q9n, Q27a; Ti-b, 7-51)

525-K.* (Russian.) **Fuzing of Brass on Steel Products by Gas Flame.** I. A. Nenaezdnikov. *Svarochnoe Proizvodstvo,* July 1958, p. 35-38.

Causes of crack formation when fuzing brass on carbon steel as well as on Ni-Cr-Mo steels of 22-24-mm. thickness used in shipbuilding. Heating of complex shapes to 900-950° before fuzing results in largest number of cracks. More cracks form on alloy than on carbon steel. Absence of cracks in fuzed brass layers is to be explained by its high plastic qualities in the process of crystallization. Varying temperature with different shapes and sizes will minimize cracks. (K2h, 9-72; Cu-n, CN, SS)

526-K.* (French.) **Arc Welding.** Victor Caron. *Ingenieur,* v. 44, Summer 1958, p. 9-11.

Thermal and metallurgical principles and phenomena. (K1)

527-K. (English.) **Some New Resistance Welding Machines of Czechoslovak Manufacture.** Mario Benes. *Czechoslovak Heavy Industry,* no. 5, 1958, p. 2-8.

(K3, 1-52)

528-K. (English.) **Several Interesting Examples of Resistance Welding Applications Used in the Czechoslovak Industry.** Ladislav Pliva. *Czechoslovak Heavy Industry,* no. 5, 1958, p. 9-15.

Application of spot, seam or flash welding in joining low-carbon steel for concrete reinforcement; welding sheet steel for automobile body component, joining thin steel wire, welding Cu to Al and producing motorcycle rims. (K3; ST, Al, Cu)

529-K. (English.) **Czechoslovak Automatic and Semi-Automatic Submerged Arc Welders.** Miloslav Pavlasek and Miroslav Duben. *Czechoslovak Heavy Industry,* no. 5, 1958, p. 17-27.

(K1e, 1-52)

530-K. (English.) **Automatic Welding of Boiler Stays Under Flux.** Adolf Turek and J. Lukasek. *Czechoslovak Heavy Industry,* no. 5, 1958, p. 28-31.

Joining steel stays to boiler wall by means of automatic submerged arc welding. (K1e, T26q)

531-K. Silver Brazing Gives High-Strength Joints. *Metalworking,* v. 14, July 1958, p. 10-11.

(K8j; Ag)

532-K. How to Calculate Stresses in Adhesive Joints. H. A. Perry. *Product Engineering,* v. 29, July 7, 1958, p. 64-67.

(K12, Q25k)

533-K. (Russian.) **Weldability of Ferrite-Austenitic Steels.** I. A. Zaks. *Svarochnoe Proizvodstvo,* July 1958, p. 5-10.

Experiments with welding of high-strength corrosion resistant steels with minimum yield point of 40 kg. per sq. mm. Exposure for 2-3 hr. at 650-850° greatly increases corrosion resistance. 7 ref. (K9s, R-general; SS)

534-K. (Russian.) **Welding of Turbine Martensite Steel.** G. A. Nikolaev and A. V. Mordvintseva. *Svarochnoe Proizvodstvo,* July 1958, p. 1-5.

Experiments show possibilities of welding turbine sections of high-alloy martensitic steel in protective medium. 4 ref. (K1d, W11m; SS-c)

535-K.* Shrink-Fitting by Stress Relief. A. Peiter. *Engineers' Digest,* v. 19, July 1958, p. 305-307.

Relief of internal stresses in a quenched steel ring causes it to contract. This principle used to obtain shrink-fitting of rings on shafts. 4 ref. (K13r)

536-K.* (German.) **Adhesive Bonding of Metals, a New Joining Method.** H. Rebeski. *Werkstattstechnik und Maschinenbau,* v. 48, June 1958, p. 302-306.

The bonding of thin sheet metal in the outer skin of an airplane wing. The joints are riveted after bonding, then the skin is tightened around the wing with the help of a special fixture giving the upper wing an initial stress to prevent folds. Since the adhesive should not harden during these operations, a thermosetting cement is used and hardened afterward by heat. Other required properties of the adhesive are resistance to peeling, weathering and changes in temperature. (K12, T24a; NM-d30)

537-K. Soldering of Uranium. G. S. Hanks, D. T. Doll, J. M. Taub and E. L. Brundige. *U. S. Atomic Energy Commission TID-8018*, 1958, 15 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Joining of uranium to uranium using a number of commerical soft solders and fusible alloys. Ultrasonic soldering iron has proved the best method for joining U to itself and to other metals, such as stainless steel. The soldering characteristics of U may best be compared to those of Al. (K7; U)

538-K. Welding Thin-Walled Uranium Cylinders. E. L. Brundige, J. M. Taub, G. S. Hanks and D. T. Doll. *U. S. Atomic Energy Commission TID-8019*, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D.C.) $.50.

Inert-gas shielded-arc method without filler metal gave uranium welds free from porosity, cracks and oxide inclusions. Tensile strength and yield strength exceeded the strength of cast metal. Surface condition and purity of the inert-gas used affected weld soundness. Straight polarity direct current was used to achieve maximum penetration and to provide arc stability. (K1d; U)

539-K. LC Welding—It's Really Cool. *Canadian Metalworking*, v. 21, Aug. 1958, p. 24-26.

"LC" arc welding system deposits conventional flux-covered electrodes, and while so doing, drains resistance heat out of the electrodes as they are being consumed by the arc and converted into weld metal. (K1a)

540-K. Evaluation of Spot Welds Made Through Primers and Sealers. B. A. Schevo. *Welding Journal*, v. 37, Aug. 1958, p. 799-802.

Primers and sealers were found to have no detrimental effect on the weld strength when welding was performed in accordance with proper procedure. (K3n, K9r)

541-K. Current Welding Research Problems. *Welding Journal*, v. 37, Aug. 1958, p. 379s-384s.

List was made to inform Welding Research Council project committees and university research workers of some of the more important problems facing industry. Suggestions come largely from engineers, scientists and executives of American industry and government agencies. (K-general, A9)

542-K. (Italian.) **Submerged Arc Welding Machines. Pt. 1.** Oscar Grossi. *Ingegneria Meccanica*, v. 7, Jan. 1958, p. 61-66; Feb. 1958, p. 7-15.

(K1e, 1-52)

543-K. (Italian.) **Unionarc Welding Process.** Oscar Grossi. *Ingegneria Meccanica*, v. 7, Apr. 1958, p. 21-24.

(K1d)

544-K. (Book.) **Handbook of Fastening and Joining of Metal Parts.** Vallory H. Laughner and Augustus D. Hargan. 622 p. 1958. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $15.

Screw and pipe threads; screws, bolts and nuts; locking nuts, washers and retaining rings; riveting, setting and staking; gas, arc and thermit welding; brazing and soldering; adhesives and adhesive-bonded joints. (K-general)

545-K. (Book.) **Elevated Temperature Properties of Weld-Deposits and Weldments.** 228 p. 1958. American Society for Testing Materials, STP 226. Special Technical Publication, 1916 Race St., Philadelphia 3, Pa. $5.50.

Elevated temperature data on steels and similar alloys as presented by current good welding practice.
(K1, Q-general, 2-62; SS, ST, 7-51)

546-K.* Gas Shielded Self-Adjusting Arc Welding as Applied to Steels. H. Levinsohn. *New Zealand Engineering*, v. 13, July 15, 1958, p. 273-278.

Control, efficiency of shielding with argon, helium and CO_2, with and without O_2 added, on stainless steels. (To be continued.)
(K1d; SS)

547-K. Joining and Inspection of Joints. J. C. Herr. Paper from "Sheet Materials for High Temperature Service", American Society for Metals, 1958, p. 69-74.

Problems of brazing, welding and bonding of stainless steel, Ti, Mg and Al alloys. Inspection techniques include X-ray, fluoroscopy and ultrasonics.
(K-general, S13; SS, Ti, Mg, Al)

548-K.* (German.) **Repair Welding Cast Iron Ingot Molds.** Karl Petschauer. *Giessereitechnik*, v. 4, June 1958, p. 125-128.

Cast iron ingot molds used in steel mills frequently crack due to

the extreme stress developed. In preparation for repair the erosions are cleaned to the bare metal and the cracks are widened. This may be done with oxy-acetylene process or arc welding using carbon electrodes. Test results show Brinell hardness 110-205 and structural strength 14.2-24.5 kg. per sq. mm. (K1h, K2h, W19c; CI, 18-72)

549-K.* (French.) **Welding Chromium-Molybdenum Steel.** Paul De Marneffe. *Revue de la Soudure,* v. 14, no. 2, 1958, p. 67-73.

Welding methods for Cr-Mo steels used in the construction of oil refineries. Homogeneous welding usually is not possible because the complicated forms and large dimensions preclude subsequent heat treatment. Heterogeneous welding with austenitic electrodes appreciably decreases stress due to contraction and does not change the composition of the steels. Austenitic electrodes depositing a steel with mixed microstructure containing some ferrite show less cracks. Completely austenitic steels perform better in spite of the presence of some microcracks, which may even be helpful in reducing stresses. (K1; AY, SS, *Cr, Mo*)

550-K.* (French.) **Problem of Cracking in Austenitic Stainless Steel Welding.** Jean Sebille. *Revue de la Soudure,* v. 14, no. 2, 1958, p. 91-118.

Types and origin of cracks; structure; intergranular constituents; dendrictic segregation problem; chemical components, including Cb, S, O and contamination of chemical origin; influence of sigma phase; influence of stress; grain size resulting from different welding methods. Ferrite introduced into austenitic stainless steel decreases chances of cracking. 81 ref. (K9n, 9-72; SS-e)

551-K.* **Magnetic-Force Welding.** Ford R. Park. *Product Engineering,* v. 29, Sept. 15, 1958, p. 82-85.

Adaptation of projection welding techniques, applying forging pressure at time when weld zone is most fluid permits strong weld without damage to vinyl coating. (K3q)

552-K.* (Dutch.) **Manufacture of High-Pressure Containers.** J. H. A. Wennink. *Lastechniek,* v. 24, June 1958, p. 101-103.

Pressure vessels manufactured either from low-alloy, creep proof, heat resistant steel with 1% Cr and 0.5% Mo corresponding to ASTM 301-Gr.B or from "clad steel" (i.e., steel with 0.5% Mo-type ASTM 204-Gr. A), clad with 4 mm. 18-8 stainless steel (Type 347). Both materials are preheated to 200° C. before autogenous cutting and welding. Plates are cut, tested with ultrasonics and formed into semicylindrical bodies either by press or by hot rolling. When welded, the filler metal must have the same composition as the base metal. Weld testing methods. (K9, T26q; SS)

553-K. Arc Spotwelding Stiffens Louver Panels. Richard Molthop. *American Machinist,* v. 102, Sept. 8, 1958, p. 90-91.

Manual arc welder joins angle-iron stiffeners to sheet stock by spot welding through a drilled templet. Eliminates sheet distortion and reduces costs without loss in quality. (K1d; CN-g)

554-K. Fastening Devices. John J. Dwyer, Jr. *American Machinist,* v. 102, Sept. 8, 1958, p. 97-112.

Properties, applications of rivets, screws, bolts, studs, locknuts, inserts, pins, washers, retaining rings, quick release fasteners. (K13)

555-K. High Quality Fusion Welding of Aluminum. Pt. 2. Thomas B. Correy. *Light Metal Age,* v. 16, Aug. 1958, p. 12-14, 16, 22.
(K1, W29a; Al-b)

556-K. Contribution of Brazing in Light Engineering. E. V. Beatson. *Machinery (London),* v. 93, Aug. 27, 1958, p. 473-481.

Brazing of heat resistant alloys, stainless steel; high-frequency and induction brazing; process selection, design and development of methods. (K8; SS)

557K. Pressure Welding. *Metal Industry,* v. 93, Aug. 22, 1958, p. 152-154.
(K5)

558-K. Soldering Aluminum — a Simple Fluxless Technique. G. M. Bouton and P. R. White. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. G10-G11.

High-strength joints formed by heating pieces with a torch, applying a Zn-base solder stick. Solder flows under oxide film, wetting Al, giving secure bond. (K7c; Al-b)

559-K. Ultrasonic Welding Comes of Age. J. Byron Jones and W. C.

Potthoff. *Tool Engineer,* v. 41, Sept. 1958, p. 90-94.
(K6r)

560-K. Brazing Honeycomb Sandwich. Frank J. Filippi. *Tool Engineer,* v. 41, Sept. 1958, p. 98-101.

Brazing done in inert gas-filled retort, using pneumatic bay for pressure, temperatures up to 2200° F. Uniform heating obtained by using dummy mass to create thermal balance. (K8j; 7-59)

561-K.* (Dutch.) **Welding of Stainless Steel.** B. Mulder. *Lastechniek,* v. 24, June 1958, p. 95-100.

Use of tack welds in preliminary spacing of plates; shrinking phenomenon in tack welds. Magnetic field effect on the arc. Electrodes are of stainless steel. (K1; SS)

562-K. (Dutch.) **Stud Welding in Practice.** J. A. N. Clevers. *Lastechniek,* v. 24, June 1958, p. 103-106.

Stud welding can offer various advantages; time saving, no weakening of the material by drilling holes, lighter construction and no leaks. Has been used for several decades in America in ship-building, construction of buses, boiler-making, anchoring of fire resistant furnace walls, bridge-building and suspension of pipelines. (K1f)

563-K. (Japanese.) **Ultrasonic Welding.** Naoyuki Watanabe. *Metals,* v. 28, July 1958, p. 512-515.

High-tension ultrasonic waves can weld either homogeneous or heterogeneous pairs of metals. Static load range is 2 to 360 kg., frequency is 4 to 40 kc., power is 100 w. to 2 kw., and a pulse lasts 0.5 to 1.5 sec. Method is most suitable for welding metallic foils but is also applicable for thin plates. Metals are welded without being melted. (K6r)

564-K.* **Welding the Refractory Metals.** L. F. Yntema. *Metal Progress,* v. 74, Sept. 1958, p. 105-108.

Tantalum, columbium, molybdenum and tungsten are used on many devices operating at high temperatures because of their high melting points and high-temperature strength. Because of their reactivity with air and their affinity to low-melting metals, they require careful control of welding variables. (K-general; EGA-d, Ta, Cb, Mo, W)

565-K.* **Effect of Surface Treatment on the Adhesive Bonding Properties of Magnesium.** H. W. Eickner. *University of Wisconsin, Forest Products Laboratory, U. S. Dept. of Agriculture,* no. 1865, June 1958, 30 p.

Several types of surface treatments for AZ31-H24 Mg, including deoxidizing, chemical sealing and anodizing methods, were investigated as pretreatments for bonding with commercial metal-bonding adhesives. In addition to original tests of bond quality, tests were also made after the specimens were aged at elevated temperature, high humidity and salt-water spray conditions. 17 ref.
(K12, L-general; Mg-b)

566-K.* **Brazing Alloys for Guided Missiles.** A. T. Cape. *Metal Progress,* v. 74, Sept. 1958, p. 99-104.

Many types of brazing alloys are available and selection of the right one for the job depends on such factors as kind of materials to be joined, service to which it will be subjected and methods of brazing to be used. Modifications of standard brazing materials can be used to give added joint strength and other special properties.
(K8, T24e; SGA-f)

567-K.* **Chlorine Improves Aluminum Weld.** (Digest of "Chlorine Additions for High-Quality MIG Welding of Aluminum Alloys". M. B. Kasen and A. R. Pfluger. Western Welding, Brazing and Heat Treating Conference, Stanford Research Institute, Menlo Park, Calif., Mar. 1958.) *Metal Progress,* v. 74, Sept. 1958, p. 145-146, 148, 150, 152.

Addition of minute quantities of Cl to the arc area during flat-position MIG welding of Al-Mg alloys will effectively counteract hydrogen, propane, water vapor and oxygen when each contaminant is present in the arc area in sufficient quantity to seriously affect quality of the welds. Chlorine additions are also effective in counteracting the deleterious effects of contaminants on the filler wire surface. (K1d; Al-b)

568-K.* **Fabrication of Hollow Steel Propeller Blades.** Frank J. Altmann. *Welding and Metal Fabrication,* v. 26, Aug. 1958, p. 272-276.

Contour rolling, precision forging, flash and fusion welding in the production of hollow propeller blades from AMS 6434 steel.
(K-general, F22, F23, T24; AY)

569-K.* **Gas-Electric Welding With Constrained Moulded Joints.** D. A.

Dudko and F. M. Vinogradskii. *Welding and Metal Fabrication,* v. 26, Aug. 1958, p. 289-290.

Process details and advantages in carbon dioxide-shielded, metal-arc welding with constraining molds for semi-automatic and automatic welding of steel 0.31 to 1.5 in. thick in any position. (K1d; ST)

570-K.* (English.) **Lining a Steel Pressure Vessel With Titanium.** F. F. Ates. *Lastechniek,* v. 24, July 1958, p. 131-136.

Incorporation of fixed Ti lining, 0.8 mm. thick, into a steel pressure vessel, about 80 cm. in diameter and 4 m. long for use in petrochemical industry at working temperature of 140° C. and pressure of 8 atm. Welding equipment, conditions and procedure in spot welding and argon-shielded arc welding of Ti lining. Causes of weld cracking and failure. (K1d, K3n, T26q; ST, Ti)

571-K.* (English.) **Use and Application of Clad Steel. Metallic Liners and Overlay Deposits in the Manufacturing of Vessels for the Chemical Industry.** L. Capel and C. Nederveen. *Lastechniek,* v. 24, July 1958, p. 136-149.

Chemical composition and mechanical properties of backing plates and stainless steel cladding material. Joint design and electrode selection related to problems in welding clad steel. Effects of weld dilution by base material and mild steel electrodes on weld cracking and defects. Heat treatment and application of clad steel; application and welding of metallic liners. Deposit welding and uses for corrosion resistant stainless steel deposits. (K1, T26q; SS, 8-66)

572-K.* (Dutch.) **Welding of Aluminum in General and for Shipbuilding in Particular.** *Lastechniek,* v. 24, Aug. 1958, p. 161-170.

General direction for electric welding. Distance regulator, recommendation of a high-frequency generator to simplify the ignition and stabilization of the arc. Tools and accessories needed. Importance of careful selection and preliminary processing of the plate. Adjustment of the edges of the plates must be absolutely correct and the advance aperture must have the same width throughout; fastening plates together for butt welding; preliminary cleaning with revolving steel brush, dressing with flat chisel, removal of slag pockets, grinding; horizontal welding of butt seams; angle welding. (K1, 1-52; Al)

573-K.* (German.) **Further Development in Cold Pressure Welding.** Wilhelm Hofmann and Hans-Jurgen Schuller. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 302-311.

Silver and gold specimens were butt welded in high vacuum and results compared to welds in inert atmosphere. To reduce the pressure required for cold welding, various shapes of specimens were tried out; and the deformation process as well as the influence of time was studied. Armco iron was butt welded with Al and Cu. A joint approaching the tensile strength of Al was obtained, while with Cu cold hardening prevented consistent results. 33 ref. (K5, 1-67; Ag, Au, Fe, Al, Cu)

574-K.* (Russian.) **Effect of Arsenic on Weldability of Low-Carbon Steels.** A. G. Kalashnikov. *Stal',* v. 18, Aug. 1958, p. 736-739.

Method of forge welding without fluxes of Ct. 3 steel containing up to 0.25% As with bar thickness up to 20 mm. Weldability of thin bars of killed steel is higher than that of rimming steel. As bars increase above 20 mm. thickness, welding becomes more difficult; and with further increase of As content above 29%, the quality of the welds decrease. 7 ref. (K9s, 2-60; CN-g, *As*)

575-K.* (Russian.) **Structure and Mechanical Properties of Alloy Welds in Titanium.** S. M. Gurevich. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 18-21. (Henry Brutcher, Altadena, Calif., Translation no. 4315.)

Effect of alloy elements on structure of high-strength Ti welds. By alloying the welds to 4-5%, without changing its single-phase structure, the plasticity of the weld is preserved to a large extent. To stabilize the beta phase, the maximum limit of weld alloying should not exceed 2-3%. Alloy metal welds with an original needle-like beta phase microstructure have best plasticity and ductility after welding. 9 ref. (K9, M27, Q-general; Ti)

576-K.* (Russian.) **Localized Heat Treatment of Welds Made by Electroslag Process.** V. N. Novikov, I. E. Tutov and A. I. Kondrashev. *Metallo-*

vedenie i Obrabotka Metallov, Aug. 1958, p. 38-43. (Henry Brutcher, Altadena, Calif., Translation no. 4320.)

Welding of plate steel (100 ton) of type 22K. The large crystal structure of welds produced by electroslag process is rectified by normalizing, thereby increasing plasticity of steel. After normalizing the mechanical properties of the welds and adjacent areas are in every respect similar to those of basic metal plate, regardless of methods used to heat the weld. The most effective heating method for normalizing metal in area of weld is induction heating at industrial frequencies. For plates with 0.22% C, localized electrothermal treatment is most effective. (K6, J24; ST, 4-53)

577-K.* (Russian.) **Automatic Arc Welding of Aluminum Alloy Sheets.** G. D. Nikiforov. *Svarochnoe Proizvodstvo, Aug. 1958*, p. 7-10.

New Al alloy of excellent weldability contains 6.5% Mg, 0.7% Mn and 0.3% Ti. Combination of Mg with Al results in supersaturated alloy which does not decompose during annealing. The combination of Mn with iron, $Al_6(MnFe)$, increases corrosion resistance of alloy. Welding by fuzing electrodes under blanket of flux results in a weld as strong as original metal. (K1, 2-60; Al-b, 4-53)

578-K.* (Russian.) **Study of Tendency of Weld Metal to Form Hot Cracks.** M. Kh. Shorshorov and V. S. Sedykh. *Svarochnoe Proizvodstvo*, Aug. 1958, p. 10-14.

Investigation of low-carbon and austenitic steels, welded with different types of electrodes. Hot cracks formed during crystallization of metal seam as result of tensions arising during cooling of weld. Liquid layers are present during formation of dendrites. At a given interval during crystallization the metal has extremely low plasticity. It is during these temperature intervals that cracks form at points where the intermetallic bonds are weakest. 7 ref. (K1, K9, 9-72; CN-g, SS)

579-K.* (Slovakian.) **Copper-Phosphorus Brazing Alloys.** Pavel Slysko. *Zvaranie*, v. 7, Aug. 1958, p. 245-248.

Copper and low-carbon steel were brazed with the mixture Cu-P8 (=CSN 423370). To braze tombac, a high-phosphor mixture (5.72% Ag, 86.8% Cu, 7.15% P and 56.5% Cu, 2.0% Si, 5.90% P, 35.5% Zn) and a low-phosphor mixture (56.5% Cu, 2.05% Sn, 0.98% Si, 3.96% P, 36.5% Zn) were used. For steels, the above mixtures are not recommended because of the formation of brittle phosphides in the transition zone between the basic metal and the braze alloy. (K8; Cu, CN-g, SGA-f)

580-K.* (Slovakian.) **Repair Welding of Slag Pits in the Surface of Railway Wheels.** Ladislav Muncner. *Zvaranie*, v. 7, Aug. 1958, p. 251-252.

Slag pits in the larger flat surface of 20 x 30 x 300-mm. tires of unalloyed carbon steel with 0.43% and 0.60% C repaired by cutting out pit to clean material, preheating to 320-370° C., filling pit using a 5-mm. diameter electrode E44.33 or E44.83, reheating to 320° C. for ¼ to 1 hr. in air, tempering at 540-560° C. for 5 hr. in air, grinding smooth. Repaired surface tested for defects. (K1, 18-72, T23; ST)

581-K.* **The Relationship Between Weld Cracking and Alloy Constitution in Some Binary and Ternary Magnesium Alloys.** C. L. Kobrin and R. A. Dodd. *American Society for Metals, Transactions*, v. 51, Preprint no. 101, 1958, 7 p.

The susceptibility to weld cracking of alloys corresponding to various Mg-rich binary systems is investigated using a restrained weld test. The variation in results with the different alloy systems can be reasonably well interpreted in terms of the respective solidification ranges, and only the Mg-rich Mg-Zn alloys are sensibly prone to cracking. Cracking versus composition contours are given for the industrially important Mg-Zn-Al and Mg-Zn-rare earth systems. 14 ref. (K9n, M24b, M24c; Mg, 9-72)

582-K.* **Resistance Welding Procedures and Design.** Lester F. Spencer. *Welding Engineer*, v. 43, Oct. 1958, p. 44-47.

Resistance welding equipment and controls. Single-phase a-c. machines are the "work horses". The dry-disk rectifier system, used for spot, projection and seam welding, is also used to convert three-phase power to single-phase d-c. In welding high-conductivity alloys and materials with narrow plastic ranges, the equipment must have low inertia in the electrode holder and a movable head. Both pre- and postheat controls are mandatory in resistance welding hardenable carbon and alloy steels. (K3, 1-52, W29c)

583-K.* Ultrasonics: a "Sound" Welding Technique. *Welding Engineer,* v. 43, Oct. 1958, p. 52, 53.

Degreasing, welding, weld inspection and shop decontamination are some of the uses of ultrasonic sound waves. (K6r)

584-K.* Submerged-Arc Welding of Uranium. Gale S. Hanks, J. M. Taub and E. L. Brundige. *Welding Journal,* v. 37, Sept. 1958, p. 890-896.

Submerged-arc process offers a welding technique where the flux forms a fluid protective blanket above the liquid filler metal. Both fused flux and filler metal cool and solidify under the unfused flux. Properties of weld metal made by submerged-arc welding using the developed flux showed tensile strengths nearly 65% greater and yield strengths approximately 95% greater than those of as-cast metal. (K1e; U)

585-K.* Comparisons Between Welds in Iodide and Sponge-Base Titanium Alloys. W. J. Lewis, M. L. Kohn and G. E. Faulkner. *Welding Journal,* v. 37, Sept. 1958, p. 385s-390s.

Comparisons between the tensile strength, weld-joint bend ductility and weld-metal notch toughness of the iodide and sponge-base alloys, indicated that increased interstitial and substitutional alloy content strengthened the alloys, but weld-joint bend ductility and weld-metal notch toughness were adversely affected. Starting with iodide-base alloys which contain 1.5% beta stabilizers, the tensile and yield strengths were doubled (an increase of 40,000-60,000 psi.) by combining the strengthening effects of the higher interstitial content of the sponge-base alloys, a 1.5% beta-stabilizing addition and a 3% Al addition. (K9r, K9s; Ti-b)

586-K.* Experimental Results of the Slag-Metal Interaction in Manual Arc Welding. Minoru Okada and Harumasa Nakamura. *Osaka University, Technology Reports,* v. 7, Oct. 1957, p. 425-437.

Study of the reaction $(FeO) + [Mn] \rightleftarrows [Fe] + (MnO)$ in manual arc welding of steel. The following reactions are observed: (1) reaction of filler metal and flux passing through air; (2) reaction in the molten pool. (K9n, K1)

587-K.* (Russian.) Welding Cast Austenitic Steel. A. E. Runov, F. I. Pashukanis and K. V. Lyubavskii. *Svarochnoe Proizvodstvo,* Aug. 1958, p. 1-7.

Presence of a certain quantity of the ferrite phase in the original cast austenitic Cr-Ni steel eliminates cracking which has led to development of new alloy—IX20N12T-L—that can withstand prolonged working at 600°. Alloy has ferrite content of 1.5%, and has high plasticity after heat treatment as well as after aging. Variation in cooling rate has no effect on ferrite phase or steel structure. 7 ref. (K9, 2-60; SS, 9-72)

588-K.* (Russian.) Pressure Welding of Heterogeneous Metals Under Vacuum. N. F. Kazakov. *Svarochnoe Proizvodstvo,* Aug. 1958, p. 23-24.

Success in welding metal-ceramics depends on Co content as well as on grain size. The smaller the grain structure the stronger the weld. Pressure and surface cleanness also have big influence. Increase in pressure at low temperatures shows little effect on weld strength, but pressure increase at high temperatures has a marked effect. The rougher the surface, the weaker the welds. Welding in vacuum, and without oxidation, eliminates brittle cracks and other defects. (K5, 1-73; 6-70)

589-K. Boost Powder Metal Part Size. R. H. Weichsel and E. T. Johnson. *Iron Age,* v. 182, Oct. 2, 1958, p. 80-81.

Large, complex powder metal bearings, other shapes possible through new Ag soldering technique which creates thin joints with strength equal to parent metal. (K7f; Ag, 6-72)

590-K. Dip Brazing of Aluminum Pays With Accurate Assemblies. E. G. Slotta. *Iron Age,* v. 182, Sept. 25, 1958, p. 92-93. (K8n; Al-b)

591-K. Magnetic-Flux Gas Shielded Arc Welding. J. E. Dato. *Iron and Steel Engineer,* v. 35, Sept. 1958, p. 160-165.

New process, using flux conveyed to wire electrode by CO_2 shielding gas and magnetically coating the wire, produces rapid, sound welds. (K1d)

592-K. Riveting Is No Small Job. Bartlett West. *Modern Machine Shop,* v. 31, Oct. 1958, p. 117-121.

Semi-automatic riveter is used in scatter-pattern riveting of large fuselage panels for DC-8 jet-propelled airliners.
(K13n, W1h, T24a; 18-74)

593-K. Fabricating Plastic-Clad Sheet Metals. *Welding and Metal Fabrication,* v. 26, Aug. 1958, p. 294-297.

Techniques utilized in drawing, spot welding, projection welding, steel or Al sheet laminated with polyvinyl chloride film.
(K3, G4; Al, ST, 7-59)

594-K. Control of Melting Rate and Metal Transfer in Gas-Shielded Metal-Arc Welding. Pt. 2. Control of Metal Transfer. W. A. Lesnewich. *Welding Journal,* v. 23, Sept. 1958, p. 418s-425s.

Axial-spray transfer is preferred to globular transfer and to rotating-spray transfer to assure maximum arc stability and minimum spatter.
(K1d)

595-K. Cooperative Investigation of a New Welding Electrode for Stainless Steel. R. D. Wylie. *Welding Journal,* v. 23, Sept. 1958, p. 426s-432s.

Evaluation of a new welding procedure for use in high-temperature steam piping. Tensile properties, impact-test results including the effect of aging, corrosion and oxidation resistance, high-temperature creep, relaxation and stress-rupture. 16 ref.
(K1, W29L, Q-general; SS, 4-60)

596-K. (Russian.) **New Materials and Equipment for Gas Welding.** *Svarochnoe Proizvodstvo,* Aug. 1958, p. 37-41.
(K2, 1-52)

597-K. (Russian.) **Vibration Strength of NL2 Steel Butt Welds.** V. N. Savel'ev, D. I. Navrotskii, V. A. Makurin and V. Yu. Shishkin. *Svarochnoe Proizvodstvo,* Aug. 1958, p. 14-18.

Uniform strength of low-alloy steel welds can be obtained by vibrational as well as static stress. Method proposed for eliminating localized weaknesses so as to achieve uniform butt weld strength.
(K1, Q27; ST, 7-51)

598-K. (Pamphlet.) **Kaiser Aluminum Weldor's Training Manual—Inert Gas Process.** 129 p. 1958. Kaiser Aluminum and Chemical Sales, Inc., 919 N. Michigan Ave., Chicago 11, Ill. $1.

First section presents essential factors about both tungsten-inert-gas and metal-inert-gas welding techniques. Second and third sections offer step-by-step exercises.
(K1d, A6k; Al)

599-K.* New Power Source Broadens Use for CO_2 Welding. H. J. Bichsel, E. J. Steinert and E. R. Gamberg. *Iron Age,* v. 182, Oct. 23, 1958, p. 61-63.

Automatic all-position CO_2 welding is now possible by the use of a dynamic reactor, developed by Westinghouse, that limits the rate of weld current. It permits the use of larger wire sizes and, for the first time, use of CO_2 for vertical and overhead welding.
(K1d, W29c)

600-K.* (Slovakian.) **How to Weld Circular Sections by the Vertical Electro-Slag Process.** Julius Zeke. *Zvaranie,* v. 7, July 1958, p. 196-200.

With rectangular sections the space between the parts to be welded is filled, starting from a shelf. To provide secure welding of circular sections two designs are illustrated.
(K6)

601-K. Design for Production by Welding. John Mikulak. *Welding Journal,* v. 37, Sept. 1958, p. 871-881.

Weldments designed for optimum performance and fabrication economy often combine castings, forgings, pressings and extrusions with plates and shapes. (K-general, 17-51)

602-K. Inert Gases for Controlled-Atmosphere Processes. E. F. Gorman. *Welding Journal,* v. 37, Sept. 1958, p. 882-889.

Effective application of argon or helium for controlled-atmosphere processes depends upon utilization of appropriate purging techniques for chambers or furnaces.
(K1d, W29e)

603-K. An Investigation of Lap Seam Welds in 17-7 PH Stainless Steel. E. J. Funk and A. C. Willis. *Welding Journal,* v. 37, Sept. 1958, p. 897-905.

Development and calibration of instrumentation for measurement of welding current. Seam welding of 17-7 PH stainless steel in TH-1050 condition. (K3p; SS)

604-K. (Czech.) **A New Type Ceiling-Mounted Spot Welding Machine.** Ladislav Pliva. *Zvaranie,* v. 7, Aug. 1958, p. 238-244.

Welding machine KP24 (24-kva. transformer efficiency), and tongs. (K3n, 1-52)

605-K.* High Strength Titanium Alloy Has Good Weldability. F. A. Crossley. *Iron Age*, v. 182, Oct. 30, 1958, p. 84-86.

With low alloying additions the best hope of getting high strength lies in age or dispersion hardening. A new Ti-3Mo-0.25Be alloy shows commercial promise. Data were obtained for a 10-lb. ingot made from 100-Bhn. sponge by double arc melting. Graph shows hardness versus solution temperature and aging time. Data on tensile strength, structure, strength of fusion welded samples, creep resistance. (K9s, J27, Q-general; Ti-b)

606-K.* Die-Cut Adhesive Film Bonds Iron to Aluminum. *Iron Age*, v. 182, Oct. 30, 1958, p. 88-89.

High-strength, thermosetting film adhesive, a nitride phenolic. Room-temperature shear strength of the film ranges from 2800 to 3500 psi., and its peel strength is 168 lb. per in. of film width. Other qualities of the film adhesive include good flexibility and resistance to salt spray, high humidity and oil. Assembly of plates. (K12; Fe, Al)

607-K.* Quality Welds Join Missile Engine Frames. George H. DeGroat. *Metalworking Production*, v. 102, Oct. 10, 1958, p. 1787-1788.

All welding is by the gas-shielded arc technique with tungsten electrodes and AWS 502 filler rod. Complete penetration is required in all joints. The arc-shielding gas is argon, which is also applied as a back-up gas on lower joints in the frame. A lighter-than-air mixture of 75% He and 25% A is the back-up for upper frame joints. (K1d, T24b)

608-K.* New Techniques for Welding Aluminum Plate. A. A. Smith. *Welding and Metal Fabrication*, v. 26, Sept. 1958, p. 312-317.

Supplementary argon nozzle enables satisfactory welding at currents hitherto unusable because of the formation of gross oxide films and unstable arc condition known as puckering. (K1d, 1-52; Al)

609-K.* Post-Weld Treatment of Welded Units for the Relief of Stress S. J. Watson. *Welding and Metal Fabrication*, v. 26, Sept. 1958, p. 318-322.

Relief of residual stresses generated by thermal contraction after welding minimizes risk of subsequent distortion or cracking. Level of residual stress after heat treatment depends on such factors as material composition, stress-relieving temperature and time, stress level before treatment. 9 ref. (K9q, J1a)

610-K.* Fabrication Reactors for a Catalytic Reforming Unit. *Welding and Metal Fabrication*, v. 26, Sept. 1958, p. 323-327.

Difficult welding and fabricating problems in the construction of Cr-Mo steel reactors, and pressure vessels for a catalytic reforming unit. Three welding methods were used: manual metal arc, automatic submerged arc and inert-gas-shielded arc. (K1, T26q, W11p; AY, *Cr*, *Mo*)

611-K.* Vacuum Welding of Metals. J. A. Stohr and J. Briola. *Welding and Metal Fabrication*, v. 26, Oct. 1958, p. 366-370.

Ability to concentrate considerable energy on very small surface areas facilitates production of high-quality, accurate welds, which cannot be obtained by any other fusion method. Localization of energy precludes undue over-all heating of the workpiece to avoid distortion and to produce accurate fabrications. Chemical cleanliness makes the process of interest to industries such as atomic energy or the manufacture of electronic valves. (K6, 1-73)

612-K.* Practical Aspects of Automatic Welding. J. A. Lucey. *Welding and Metal Fabrication*, v. 26, Oct. 1958, p. 375-380.

Processes for automatic arc welding of carbon steels compared, namely: submerged-arc, using a continuous coil of bare wire and a granulated welding composition which shrouds the arc; visible arc, employing a continuously coated electrode, generally known as the Fusarc process; Fusarc/CO_2 process, in which a shield of carbon dioxide gas is used in addition to the coated electrode. Study of joint design, edge preparation and fit-up, joint cleanliness and welding in the open welding current, arc voltage, speed and gage of electrode is made. (To be continued.) (K1)

613-K.* (German.) Welding of Nickel and Nickel Alloys. H. Herrmann. *Giesserei Praxis*, no. 17, Sept. 10, 1958, p. 344-346.

Because of high corrosion resistance, Ni and Ni alloys are increasingly used for coatings on iron and steel. Physical properties of pure Ni and different alloys. Characteristics of Monel, K-Monel, Corronel, Inconel. All types are well suited for welding procedures provided preparation of joints and condition of material is adequate. Six types of welding are autogenous, electric arc, carbon arc, inert-gas-shielded, atomic hydrogen and resistance welding. (K-general; Ni)

614-K.* (German.) **Long-Time Stress Tests With Bonded Light Metal Joints.** K. F. Hahn. *Metall*, v. 12, Sept. 1958, p. 811-814.

Light metal strips (Al-Cu-Mg) 20 x 1.5 mm. bonded with "Araldit 123B" and "Redux". Joints affected by high temperatures; even at room temperature elongation and breaking in finite time were observed with a load of 50% breaking strength. 7 ref. (K9, K12; Al-b)

615-K.* (German.) **Internal Stresses in Welds Detected by New Method.** W. Radecker. *Schweissen und Schneiden*, v. 10, Sept. 1958, p. 351-358.

Stresses in rimming converter steel, rimming openhearth steel, mild steel, steel for gas cylinders tested by filling a circular notch on the surface using different electrodes and boiling the weld in a 60% solution of anhydrous calcium ammonium nitrate. By observing corrosion along hairline cracks, stresses can be detected. Effect of stress-relief treatment. 5 ref. (K9r, Q25, 1-54; ST)

616-K.* (German.) **Experiments With the Electroslag Welding Process.** R. Muller. *Schweissen und Schneiden*, v. 10, Sept. 1958, p. 359-367.

Experimental welding of 50-mm. sheet metal with 44 v. and about 500 amp. with one electrode. Slag produced with powder UM 90. Process explored by X-rays. Relationship between feeding speed of electrodes and amperage and feeding speed and specific electric energy. Welds made with different electrodes, base metals, more than one electrode, stationary and swinging electrodes. Examination by metallograph, chemical and physical tests. 6 ref. (K6)

617-K.* (Japanese.) **Cold Welding of Metals Other Than Iron.** T. Saito and K. Yamaji. *Metals*, v. 28, Sept. 1958, p. 702-708.

Temperature change of the surface is observed by a thermocouple during the welding process but no appreciable change is found. Microscopic test, even with electron microscope, cannot detect the welded surface. Atomic diffusion of Al in Cu solid solution near the welded surface is detected by electron diffraction analysis. During the process of cold welding, many dislocations may occur under large stress and, therefore, many atomic vacancies may occur, which make atomic diffusion possible. (K5)

618-K. New Welding Techniques Ready Titanium for CPI. *Industrial and Engineering Chemistry*, v. 50, Sept. 1958, Pt. 1, p. 71A-72A.

Simple fusion, resistance and flash welding techniques. Shielding with argon and helium is required. (K-general; Ti-b)

619-K. Pressure Welding of Metals. D. R. Milner. *Nature*, v. 182, Sept. 6, 1958, p. 638-639.

Report on Conference at University of Birmingham, June 19, 1958. (K5)

620-K.* (French.) **Deep Penetration Arc Welding With Coated Electrodes. Pt. 4. Results. (Installment 2.) Effects of Electrical Characteristics on Depth and Uniformity of Penetration. Study of Soundness and Mechanical Characteristics of Joints.** A. Gaubert. *Soudage et Techniques Connexes*, v. 12, July-Aug. 1958, p. 249-262.

Evaluation of penetration and joint soundness in welds made on a.c. and d.c. and with various types of current-generating equipment. Other factors found to influence soundness were welding speed, arc length and water content of electrode coatings. Mechanical characteristics and crack sensitivity were determined in temperature range from minus 20 to plus 40° C. A killed Martin steel was principal test material; a few tests were made on Thomas steel. (K1a; ST)

621-K.* (French.) **Welded Equipment at the Marcoule Plutonium Extraction Plant.** P. Couturier. *Soudage et Techniques Connexes*, v. 12, July-Aug. 1958, p. 277-289.

Welding procedures used on stainless steel piping, storage and processing tanks in extraction and purification equipment, where corrosion (nitric acid) and absolute tightness are of prime importance. Since operations started only recently, no

data are available on performance of welds; however, mechanical tests and radiographic inspection of welded assemblies indicate that they will be satisfactory. Extraction process is described and diagrammed. (K-general, C-general, T29, 17-57; Pu, SS)

622-K.* High Quality Fusion Welding of Aluminum. Pt. 3. Tungsten Electrodes. Thomas B. Correy. *Light Metal Age,* v. 16, Oct. 1958, p. 8-13.

Discussion of pure W, Th-W and Zr-W electrodes; various factors affecting weld quality; effect of improper gas flow; ventilation. 25 ref. (K1c, W29h; W, Al-b)

623-K.* (German.) **Spot Welding of Heavy-Duty Aluminum Alloys.** E. A. Otte. *Aluminium,* v. 34, Sept. 1958, p. 543-544.

Features of machines used in spot welding heavy-duty materials (Al-Cu-Mg and Al-Zn-Cu-Mg alloys in airplane construction; Al-Mg-Si, $AlMg_3$ alloys in shipbuilding). Electronic control; measuring amperage and time by the Rogowski belt plus an oscillograph; control of pressure exerted by electrodes.
(K3n, 1-52; Al-b)

624-K.* (German.) **Metal Bonding Adhesives and Their Applications.** E. Bader. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 565-571.

Adhesives which will harden at ambient temperature and result in joints of high strength. Fields of application, suitable designs and constructions for bonding with adhesives. Adhesive layer with glass fiber, pretreatment of workpieces, processing of adhesives, test results. 26 ref. (K12)

625-K.* (Japanese.) **Metal Surfaces and Adhesives.** H. Hattori. *Metals,* v. 28, Oct. 1958, p. 726-730.

Cohesive force of adhesive is handicapped by the roughness of surfaces, differing thermal expansion coefficients, adsorbed water and oil, Beilby layer and oxide layer as well as the free energy of the surface. (K12, S14)

626-K.* (Japanese.) **Friction Welding.** *Metals,* v. 28, Oct. 1958, p. 772-774.

A turning lathe is used. One part to be welded is fixed and the other part is rotated. Friction causes high temperature and the two parts are plastically deformed; then lathe is stopped and the two parts are kept pressed to each other. (K6)

627-K.* (Russian.) **Effect of Electrode Vibration on Arc Welding Process and Weld Properties.** A. A. Alov and V. S. Vinogradov. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 19-22.

Electrode vibration has important effect on welding process and properties. It stabilizes burning of the arc, lessens overheating of metal, improves weld seams and makes possible welding of thin parts; results in more finely grained and uniform weld; reduces the likelihood of formation of pores, cracks and similar defects. 6 ref. (K1)

628-K.* (Russian.) **Electroslag Welding of Water Turbine Shafts.** A. S. Gellman, S. N. Mel'bard and S. E. Sinadskii. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 26-36.

Extensive research program to develop material and procedures for welding turbine shafts. Possibility of making shafts from rolled sheet steel. Use of Ti as modifier for steel 20 GSL was found unsatisfactory since it leads to embrittlement in zone adjacent to weld. Allowance of 50 mm. thickness with sheet diameter of 1500 mm. was found adequate for shafts; allowance of 16% for compensation for welding deformation and thermal treatment. 5 ref. (K6, W11k; ST)

629-K. Taming Weld Distortion in Extra-Heavy Pieces. George H. DeGroat. *American Machinist,* v. 102, Oct. 20, 1958, p. 146-147.

How a 27-ton welded assembly was made and then machined.
(K1, 3-73, 7-51, 9-74)

630-K. Production Line Steps Up Girder Welding. J. V. Banks. *Iron Age,* v. 182, Oct. 30, 1958, p. 90-92.

Giant squeezing fixture to fit flanges to webs and position assemblies for welding by automatic submerged arc.
(K1e, W29k; T26p, ST)

631-K. (French.) **Chronicle of Steelmaking. Progress in the Welding of Steel.** G. Grenier. *Echo des Mines et de la Metallurgie,* no. 3519, Aug. 1958, p. 489-491.

(K-general; ST)

632-K. (German.) **D. C. Welding Machine for Railroad and Mine Power Supplies.** K. Schydlo. *Schweissen und Schneiden,* v. 10, Sept. 1958, p. 374-376.

Welding machine equipped with a constant-speed governor to compensate unstable voltage. (K1, 1-52)

633-K. (German-French.) **Organization Problems in a Modern Welding Plant.** Othmar Hegi. *Zeitschrift fur Schweisstechnik,* v. 48, Sept. 1958, p. 238-245.

(K-general, A5, 1-52)

634-K. Evaluation of Cast Welding of Cermets to Austenitic Alloys. R. S. DeFries and E. E. Reynolds. Allegheny Ludlum Steel Corp. *U. S. Office of Technical Services,* PB 132831, Aug. 1956, 30 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Cast S-816 has the best combination of strength and ductility essential for a rotor alloy. Sound cast-welded cermets to S-816 alloy test pieces were obtained with 3½-hr. preheat at 1600° F. and pouring temperature of 2900 to 3000° F. This was determined from metallographic examination and tensile tests. (K6, Q-general; SS, 6-70)

635-K. Relationship of Metal Surfaces to Heat Aging Properties of Adhesive Bonds. J. M. Black and R. F. Blomquist. *National Advisory Committee for Aeronautics TN 4287,* Sept. 1958, 30 p.

Thermal-aging properties of five different chemical types of adhesives on stainless steel and Al revealed that a phenol-nitrile rubber adhesive was superior to a phenol-epoxy adhesive on steel, but this order was reversed on Al. Observations indicated probable specific relationships among chemical structure of the adhesive, metal adherend and the resultant thermal stability of bonds after aging at high temperatures. 12 ref. (K12; SS, Al)

636-K. Research Destructive Test Methods for Weldability. William L. Warner. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 59-90.

Tests for true weldability must show adequate demonstration of the metal's sensitivity to the effects of welding; good reproducibility of the test data from test to test; reasonable simplicity of specimen preparation and method of testing the specimen; good correlation of test results with service performance. 15 ref. (K9s, 1-54)

637-K.* (German.) **Contribution to the Arc Welding of Aluminum Alloys.** *Draht,* v. 9, Aug. 1958, p. 302.

Formation of cracks has been noted in welding thick Al-Mg-Si sheet with Al + 5% Si electrodes. Results from a decrease of Si in the weld metal in the presence of the base metal. Best results obtained when a W electrode of a duralumin alloy, H14 or H15, together with an Al-Zn-Mg-Cu base metal of 2.5 to 12.7 mm. thickness, were used and the joint was heat treated. (K1; Al-b)

638-K.* (German.) **Application of the Iron-Carbon Diagram in Welding Technology.** Friedrich-Carl Althof and Gerhard Hoffman. *Schweisstechnik,* v. 12, Aug. 1958, p. 105-112.

Welding of carbon steel; processes determined by the carbon content; pressure welding up to 1.7% C, fusion welding from 0.25% up. Effect of welding on the structure of material. Studies on stress-relief annealing, spheroidizing, normalizing, homogenizing, hardening and tempering. 10 ref.
(K9, J-general; ST)

639-K.* (Slovakian.) **Repair of Cast Iron Machine Parts by Gas Welding.** Vladimir Mutnansky. *Zvaranie,* v. 7, July 1958, p. 213-218.

The behavior of base and weld metal is tested by grinding a small spot and applying weld metal. Then edges of break are shaped to a V-groove, preserving a root. One of the following methods is used: repair weld without preheating the part; preheating up to 400° C.; preheating up to 650-750° C. according to size and shape of part.
(K2, 18-72; CI)

640-K.* **Welding Stainless Steels and H. T. Alloys. Pt. 1.** *Canadian Metalworking,* v. 21, Oct. 1958, p. 48-50, 52-54, 56-58, 60.

Carbide precipitation, influence of Ta, section thickness, sigma phase, knifeline attack, weld overlays and clad materials. Weldability of corrosion and heat resistant alloys.
(K-general; SS, SGA-g, SGA-h)

641-K* **Want Better Spot Welding? Use Basic Data.** H. Thomasson. *Canadian Metalworking,* v. 21, Oct. 1958, p. 64, 66.

Basic principles of spot welding and the machine regulation of pressure and current. (K3n)

642-K.* **Welding Cast Components for Nuclear-Power Application.** W. H. Rice. *Foundry Trade Journal,* v. 105, Oct. 16, 1958, p. 475-476.

Small castings of simple shape and of greater soundness and quality than extremely complicated castings have led to the increased demand for cast weldments. A typical example is a pump for a land-based nuclear installation. Two cast CF-8 stainless steel halves are welded together. (K1d, W13d; SS, 5)

643-K.* Six Joints to Use When Welding Titanium. *Industry & Welding,* v. 31, Oct. 1958, p. 68-70.

Thickness of weld, electrode type and diameter, root opening, angle of bevel. (K1; Ti)

644-K.* Braze Aluminum to Stainless. *Industry & Welding,* v. 31, Oct. 1958, p. 73, 99.

Combines lightness and good heat conductivity of Al with the strength, heat and corrosion resistance of stainless steel. Brazing method results in gas and liquid-tight bond that is resistant to instant thermal shocks at high temperatures; tensile strength of the bond is greater than the parent Al; high humidity, organic materials or fungi have no effect on the metallic bond. (K8; Al, SS)

645-K.* Selecting Solders for Low-Temperature Service. A. B. Kaufman. *Materials in Design Engineering,* v. 48, Nov. 1958, p. 114-115.

Based on tensile and impact strength, two Pb solders (97.5 Pb, 2.5% Ag and 95 Pb, 5% Sn) are suitable for cold environments. Retention of ductility at low temperatures in Pb-Sn alloys is a function of the Pb content. Sn undergoes an allotropic transformation and becomes brittle under long-time service below −18° F. Increasing Pb content of Pb-Sn alloys progressively lowers the minimum temperature at which these alloys are ductile; above about 70% Pb, the alloys should remain ductile to temperatures near absolute zero. 8 ref. (K7, 2-63, Q23; SGA-f, Pb, Sn)

646-K.* Fabricating Superalloys. H. E. Haley. *Tool Engineer,* v. 41, Nov. 1958, p. 96-101.

Corrosion resistant materials (Ni-Cr-Fe-Mo alloys) require special manufacturing techniques. Welding, forming, forging, heat treating and descaling. (K1, K2; Mo-b, SGA-g)

647-K. Factors in the Selection of Welding Processes. John J. Chyle. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 9-38.

Principal welding groups are arc, resistance, gas, forge, thermit, induction, welding, flow welding and brazing. Physical and mechanical properties of welds and joint design are correlated with each type. (K-general)

648-K. Engineering Aspects of Welding and Arc Cutting the Aluminum Alloys. P. B. Dickerson. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 165-178.

Useful data on welds in some of the Al alloys commonly considered for arc welded construction. Strength and ductility of welds. 10 ref. (K-general, G22g; Al-b)

649-K.* Effect of Arsenic on Mechanical Properties of Welds in Mild Steel. D. Canonico and H. Schwartzbart. *Welding Engineer,* v. 43, Nov. 1958, p. 32-35.

Arsenic in steel increased transition temperature but had no significant effect on strength. (K9r; ST, *As*)

650-K.* (German.) **Sandwich Plates in Aircraft Manufacture and Other Industries. Pt. 3.** B. R. Noton. *Aluminium,* v. 34, Oct. 1958, p. 591-595.

Strength tests with the adhesive film Redux 775 used to bond side plates to the Dufaylite core (32 mm. thick) and with the adhesive Catalin 869/6B used in the manufacture of cores. The latter was allowed to set 30 min. at 150° C. and under pressures of 0.7 to 35 kg. per sq. cm. Mechanical properties and moduli of Dufaylite-cores. (K12, T24; 7-59)

651-K.* (German.) **Metal Bonding With New Adhesives.** H. Winter and H. Meckelburg. *Aluminium,* v. 34, Oct. 1958, p. 596-608.

Composition of thermosetting and thermoplastic adhesives; average joint strength. 155 ref. (K12; Al, Cu, Mg)

652-K.* (German.) **Spatter During Arc Welding.** Friedrich Erdmann-Jesnitzer and Gottfried Pysz. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 303-311.

Spatter as a rule originates in weld metal pool shortly after passage of material from electrode (0.01-0.001 sec.). Phenomenon compared to "cooking" of steel. Attempt is made to relate spattering with gas absorption on electrode side since it is more pronounced in bare-wire electrodes. 17 ref. (K1)

653-K. Wide-Gap Brazing Alloy Assembles Engine Rings. R. C. Kellner. *American Machinist,* v. 102, Nov. 3, 1958, p. 98-99.

Join high-temperature Ni-base alloys with high Ti and Al content. Hold blades to rings in nozzle diaphragms for gas-turbine engines. (K8, W11m; *Ti, Al,* Ni, 17-57)

654-K. Slope Control Makes Better Welds. John Kelly. *American Machinist,* v. 102, Nov. 3, 1958, p. 105-107.

Conditioning the work both before and after welding current is applied. During the up-slope period, the surface is prepared by increasing the heat gradually. During down-slope, the weld is annealed. (K3, K9p, K9q)

655-K. Standard Welding Symbols. *American Welding Society,* AWS A20-58, 87 p., 1958. $3.

(K1, K2, K3; 15-61)

656-K. Special Spot Welding Methods. *Brown Boveri Review,* v. 45, May 1958, p. 223-235.

Methods suitable for batch and mass production of steel components. (K3n; ST)

657-K. How Stainless Piping Was Welded for an Atomic Sub. *Industry & Welding,* v. 31, Oct. 1958, p. 62, 63, 98, 99.

(K1, T22; SS, 4-60)

658-K. Techniques for Fabricating Magnesium. *Industry & Welding,* v. 31, Oct. 1958, p. 64-65, 96.

Rapid oxidation, preweld cleaning, heating before forming, danger of fire are problems encountered. (K1d; Mg-b, 4-53)

659-K. Resistance Welding: a Fast Way to Join Dissimilar Metals. *Industry & Welding,* v. 31, Oct. 1958, p. 66-67, 86.

Spot and projection welding join Cu, steel and phosphor bronze to bimetallics. (K3n, K3q; Cu, ST)

660-K. Tungsten Inert Arc Welding. Pt. 1. Frank Kuncz. *Industry & Welding,* v. 31, Oct. 1958, p. 71-72, 118-119.

Chemical analysis of electrodes, current chart, shielding gases and process. (K1d, W29h; W, Th)

661-K. Stored Energy Percussive Welding Joins Steel Studs to Plated Trim. *Industry & Welding,* v. 31, Oct. 1958, p. 74-75.

High heat and great speed of process joins materials without damaging plated surface. (K3a; ST, *Cr,* 8-62)

662-K. Blind Rivets Assemble Faster. *Iron Age,* v. 182, Nov. 13, 1958, p. 138-139.

Rivets are indispensible for fastening of hidden joints and also speed assembly of those easily accessible. (K13n)

663-K. Vinyl Metal Laminates. Robert J. Fabian. *Materials in Design Engineering,* v. 48, Oct. 1958, p. 98-102.

Laminates are produced in six basic steps—metal preparation, application of adhesive, solvent evaporation, heat reactivation, vinyl application, cooling. (K11)

664-K. High-Temperature Brazing Methods. John Starr. *Pacific Factory,* v. 90, Aug. 1958, p. 26-27.

Typical materials being brazed for high-temperature service are Ti alloys, Inconels, Multimet, Haynes Alloy 25, and Armco 17-7PH stainless steel. Brazing alloys include high-Ni, Ag-Mn, Mn-Ni, Pd-Ag and Pd-Ni materials.
(K8; SGA-f, Ni-b, Ti-b, SS)

665-K. Six Basic Design Suggestions for Brazed Honeycomb Sandwich. Floyd F. Rechlin. *SAE Journal,* v. 66, Oct. 1958, p. 56-63.

(K8; 7-59, 17-51)

666-K. CO_2 Welder Makes Casting Repair Easier. J. J. Chyle. *Steel,* v. 143, Nov. 17, 1958, p. 110-112.

Gas shielding eliminates slag removal, speeds rate of metal deposit, cuts labor costs.
(K1, K2m, E26, 18-72)

667-K. Defining Quality of Welding Workmanship. H. J. Bukowski. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 53-57.

Proof testing, hydrostatic testing, visual examination evaluated as indication of quality.
(K-general, S13)

668-K. Development of Welding for Engineering Fabrication. J. H. Humberstone. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 1-8.

Previously abstracted from original. See item 89-K, 1958.
(K-general, A2, 17-57)

669-K. Ship Structure. E. M. MacCutcheon. Paper from "Conference

on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 139-146.

Welding of ships' hulls.
(K-general, T22g)

670-K. Survey of Welding Codes; Standards and Specifications for Welding. Arthur Kugler. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 39-46.

Qualification testing must take into account service conditions, general design and layout, materials, detailed design, joint welding procedures, welding sequence, qualification, supervision and inspection. (K-general, S22)

671-K. Use of Steel Castings in Engineering Weldments. N. N. Breyer. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 281-293.

When to use castings or welded composite structures.
(K-general; ST, 5-60, 7-51)

672-K. Foresee Wider Scope for CO_2 Welding. *Welding Engineer,* v. 43, Nov. 1958, p. 48-50.

Introduction of reactance unit will permit use of lower currents on mild and stainless steels as well as on Al. (K1d, W29a; A1-b, SS)

673-K. Joining of Metals in Solid State by Ultrasonic Vibrations. Yu. I. Kitaigorodskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 8, Aug. 1958, p. 88-90. (Henry Brutcher, Altadena, Calif., Translation no. 4401.)

Quality of spot and continuous joints obtained with the use of ultrasonic waves as function of physical properties, surface condition and thickness of metals joined, on the one hand, and the operating conditions of the ultrasonic apparatus, treating time, contact force and contact surface, on the other. Materials used in study were Cu, Al, duralumin and stainless steel sheets. (K6r; SS, Cu, Al-b)

674-K. (German.) **Welding Techniques in the Chemical Industry.** Theodor Ricken. *Industrieblatt,* v. 58, Oct. 1958, p. 433-435.

Symposium including papers on problems arising from new materials and their processing; corrosion and welding techniques; increased requirements for welding paralleling continued developments in industry; safety of welded constructions. (K-general, T29)

675-K. (German.) **Should Metal Parts Be Pressed or Bonded to Plastic Parts?** W. Schafer and H. Stolze. *Plaste und Kautschuk,* May 1958, p. 172-175.

Bonding with epoxide resins given preference to pressing. Practical applications. 6 ref. (K11d)

676-K. (German.) **Influence of Surface Treatment on the Strength of Bonded Metal Joints.** W. Schafer. *Plaste und Kautschuk,* June 1958, p. 219-223.

Behavior of bonding material on the surface. Wetting and adhesive energy. Influence of impurities. Examples for different metals, surface treatments, bonding materials, shear strength of joints. (To be continued.) (K12, L10)

677-K. (German.) **Application of Automatic Welding Procedures.** K. H. Mathias. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 321-327.

Mathematical formulas used to determine cost of production, cost of installation, productivity of plant and to determine necessary cross section of edges to be joined. 25 ref. (K-general, 17-53, 18-74)

678-K. (German.) **Repair of a Ball Mill by Welding on Large Areas.** G. Kohlhaupt. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 327-330.

(K1; ST, CI)

679-K. (German.) **Increased Loading Capacity and New Methods in Ship Building.** Raimund Pertusini. *Schweisstechnik,* v. 12, Sept. 1958, p. 117-121.

Welding techniques.
(K-general, T22g)

680-K. (German.) **How to Avoid Intercrystalline Corrosion in Welds of Nonstabilized Steels, Type 18-8 Cr-Ni.** Josef Nemec. *Schweisstechnik,* v. 12, Sept. 1958, p. 121-126.

Experimental welding of C-Mn-Si-Cr-Ni-Mo-Ti-P-S steels and carbon steels immediately followed by water cooling. Intercrystalline corrosion tested with solution of 10% H_2SO_4, 10% $CuSO_4 + 5H_2O$. 7 ref. (K-general, R2h; SS)

681-K. (German.) **Novel Soldering and Tinning Process.** *Technik und Betrieb,* v. 10, July 1958, p. 105.

Tinning and soldering using "Epatam" solder. (K7)

682-K. (German.) **Difficulties in Soldering Copper Sheet.** *Technik und Betrieb,* v. 10, July 1958, p. 106.

Influence of soldering temperature on elastic limit. A decrease of ultimate strength and a slight decrease of the elastic limit with increasing temperature observed. (K7, Q21, 2-61; Cu-b, 4-53)

683-K. (Slovakian.) **Protection Measures Necessary in Welding Exhaust Pipes of Gasoline Motors.** Jaroslav Vodera. *Zvaranie,* v. 7, July 1958, p. 212.

(K-general, A7, T21c)

684-K. (Spanish.) **Equipment for Inert Gas Welding.** *Fusion de Metales,* v. 20, Sept-Oct. 1958, p. 9-11, 14.

(K1d, 1-52)

685-K. (Russian.) **Welding in Chemical Equipment Building.** P. T. Dmitriev. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 1-6.

(K-general, T29)

686-K. (Russian.) **Use of Low-Alloy Refined Steels in Welded Structures.** E. M. Kuzmak and V. S. Milanchev. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 11-15.

Use makes it possible to lessen weight and reduce amount of material. Prevalent practice of welding low-alloy steel without preliminary thermal treatment leads to poor welds. Welds of thermally treated steels are more uniform, stronger and cheaper. 9 ref. (K9p, 2-61; AY)

687-K. (Russian.) **Method for Evaluating Resistance of Steel to Cold Cracking During Welding.** N. N. Prokhorov and Y. L. Kakarov. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 15-18.

All factors determining tendency of steel to formation of cold cracks during welding arise in the process of austenite decomposition. Method of evaluation of cold cracking tendency consists of bending the welded sheet with constant deformation speed. (K9r, N8, 3-68, 8-72; ST)

688-K. (Russian.) **Main Trends in Welding Research at Bauman Technical School at Moscow.** G. A. Nikolaev. *Svarochnoe Proizvodstvo,* Sept. 1958, p. 22-26.

Welding rare metals; automation of welding and cutting of steels and alloys; contact welding; ultrasonic welding and strength of welds. (K-general, A9m)

689-K. (Book.) **Welding Handbook.** 4th Ed., Sect. 2, 1958, American Welding Society, 33 W. 39th St., New York 18, N. Y. $9.

Processes, operation, equipment and bibliographies for gas welding, arc welding, resistance welding. (K1, K2, 11-68)

690-K. (Book.) **Conference on Welding Engineering.** Army Engineer Research and Development Laboratories. *U. S. Office of Technical Services,* PB 131739, Apr. 1957, 462 p. $6.

Papers abstracted separately. (K-general)

691-K. 300,000 Mufflers a Month With Resistance Welding. *Industry and Welding,* v. 31, Nov. 1958, p. 34-35, 52-53.

(K3, K3p, T21c; ST)

692-K. Multiple Arc and Powdered Iron Electrodes. *Industry and Welding,* v. 31, Nov. 1958, p. 38-39, 53.

Twin-arc automatic submerged-arc head followed by a single-arc head in welding railroad freight cars. (K1a, K1e, T23p; ST)

693-K. Welding Procedures for Fabricating Aluminized Piping. *Industry and Welding,* v. 31, Dec. 1958, p. 30-31, 58-59.

Root pass alloyed with 3 to 10% Al made by controlling fusion of filler metal with the aluminized base metal. (K1d; ST, 4-60, 8-65, 8-67)

694-K. Welding Aluminum Without Distortion. *Industry and Welding,* v. 31, Dec. 1958, p. 38-39, 41-42.

Welding a truck's chassis members outward from box beam backbone. (K1, T21e; Al-b, 4-53)

695-K. 11 Facts to Know About Ultrasonic Soldering. Ralph Reynolds. *Industry and Welding,* v. 31, Dec. 1958, p. 45, 50.

How to get best results when fabricating Al. (K7h; Al)

696-K. Advances in Welding Austenitic Materials in the Construction of Chemical Apparatus and Tanks. J. Mundt. *Welding Journal,* v. 37, Oct. 1958, p. 454s, 467s.

Three areas in which full advantage has been taken of the outstanding ductility of austenitic steels are the field of low temperatures in the liquefied gas industry; the welding of clad steel; and the automatic

weld cladding of mild steel equipment.
(K-general, L24, T29; SS-e, 8-66)

697-K. Welding Cast Components for Nuclear-Power Applications. W. H. Rice. *Welding Journal,* v. 37, Oct. 1958, p. 971-978.
Base materials involved include austenitic and martensitic stainless steels such as ACI-CF-8, CF-8M, CK-8C, CH-10 and Ca-15 as well as carbon steel. Welding procedure specifications normally require use of either metallic covered electrodes or the inert-gas-shielded arc-welding process. (K1, T11; SS, CN, 5-60)

698-K. Welding Low-Alloy Steel Casting for High-Pressure and High-Temperature Service. N. A. Chapin, C. H. Soldan and L. W. Songer. *Welding Journal,* v. 37, Oct. 1958, p. 979-987.
Fabrication and repair welding using manual submerged-arc techniques of Cr-Mo and Cr-Mo-V steel castings for use in steam turbines operating at temperatures up to 1500° F. and at pressures up to 3500 psi. (K1e, W11k; AY, Cr, Mo, V, 5-60)

699-K. Welding Qualification and Component Performance. W. L. Fleischmann. *Welding Journal,* v. 37, Oct. 1958, p. 991-996.
Design considerations and quality control techniques needed to assure usable welded structures.
(K9c, 17-51)

700-K. Effects of Chemical Composition on Cracking Resistance of High-Strength Steel Weld Metals. R. P. Sopher. *Welding Journal,* v. 37, Nov. 1958, p. 481s-492s.
New method of determining causes of cracking in weld metals. Crack-free welds containing higher than normal carbon content may be deposited under restrained conditions. Weldments may be fabricated and heat treated to very high strength levels. 10 ref.
(K9r, 2-60; ST, C, S, P, EG-g, 9-72)

701-K. Metallurgy of Bonding in Brazed Joints. Pt. 1. Base Metal-Filler Metal Inspection Excluding Compound Formation. Nikolajs Bredzs and Harry Schwartzbart. *Welding Journal,* v. 37, Nov. 1958, p. 493s-498s.
Dissolving of base metal in the filler metal and structure of the solidified filler metal. 13 ref.
(K8k; ST, Cu, Ag)

702-K. Development of Methods for End Capping PWR Fuel Elements. Julius J. Vagi and David C. Martin. *Welding Journal,* v. 37, Nov. 1958, p. 499s-506s.
Satisfactory bonds produced with a medium-capacity spot welding machine for resistance-upset welding under vacuum.
(K3, T11g, 1-73; U, *Zr-b,* 8-66)

703-K. Welding of Galvanized Steels. I. L. Stern and H. Nagler. *Welding Journal,* v. 37, Nov. 1958, p. 507s-514s.
Tendency for cracking can be minimized by reduction of Zn on laying surfaces or use of techniques which favor volatilization of the Zn coating.
(K1, K9r; ST, *Zn,* 8-65, 9-72)

704-K. Report of the Second Welding Delegation From East Germany on Their Tour in Russia. F. Richter, G. Becker, P. Weisswasser and E. Leinhos. *Welding Journal,* v. 37, Nov. 1958, p. 519s, 523s, 526s-528s.
(K-general)

705-K. Mechanical Tests of Spot Welds. E. C. Hartman. *Welding Journal,* v. 37, Nov. 1958, p. 520s-523s.
Destructive mechanical tests for evaluating spot-welded joints. 11 ref.
(K3n, K9r)

706-K. Welding of Some Nonferrous and Ferrous Tubes to Tube Sheets. R. W. Bennett. *Welding Journal,* v. 37, Nov. 1958, p. 1071-1085.
Tubes are rolled or expanded into the tube sheet holes. The welding processes used are coated electrode and gas-shielded arc welding.
(K1a, K1d; 4-60)

707-K. Welding Alloy Steels Under Bonded Fluxes. Hallock C. Campbell and Wallace C. Johnson. *Welding Journal,* v. 37, Nov. 1958, p. 1081-1085.
Uses of submerged-arc fluxes in pipe welding, in preparing overlays or clad surfaces and in welding high-strength low-alloy steels.
(K1e, L22; AY, ST, 4-60)

708-K. Joining of Zircaloy to Stainless Steel. J. B. McAndrew, R. Necheles and H. Schwartzbart. *Welding Journal,* v. 37, Dec. 1958, p. 529s-534s.
Flash welding and brazing investigated. Thermal stresses were major source of difficulty.
(K3r, K8, Q25p; SS, Zr-b)

709-K. Survey of the Bonding of Cermets to Metals. G. R. VanHouten. *Welding Journal,* v. 37, Dec. 1958, p. 558s-568s.

Metallizing history, joint design, wetting, methods of increasing braze strength and correction of differential expansion. 168 ref.
(K11b; 6-70, 11-65)

710-K. Controlled Atmosphere Arc Welding. N. E. Weare and R. E. Monroe. *Welding Journal,* v. 37, Dec. 1958, p. 1169-1175.

Carefully controlled welding atmospheres are required for such metals as Zr, Ti, Mo, Hf, Cb and Ta. Design of equipment for preventing contamination by oxygen, nitrogen and hydrogen. 9 ref.
(K1d, W29, 17-51)

711-K. Value of Nitrogen as a Weld Backing Gas. R. V. Anderson. *Welding Journal,* v. 37, Dec. 1958, p. 1193-1195.

Nitrogen gas may be substituted for argon gas when used on high-nickel and stainless steel alloys.
(K1d; SS, Ni-b, N, 17-57)

712-K. Sound Welds Reported for Resistance Welded Low Carbon Steel Pipe in Evaluation Tests. Robert C. Bertossa. *Western Metalworking,* v. 16, Oct. 1958, p. 48-50.

(K3, K9r; CN-g, 4-60)

SECTION L

CLEANING, COATING and FINISHING

1-L. Science for the Coatings Technologist. Pt. 8. E. S. Beck *Metal Finishing,* v. 55, Nov. 1957, p. 50-55.

To be continued. (L26; 8-70)

2-L. Practical Metallizing of Technical Ceramics. Raymond C. Steffey. *Metal Finishing,* v. 55, Nov. 1957, p. 56-61.

Preparation of ceramic material for metallizing; applying the conducting film; firing or curing of the metallized pattern; kiln design; pattern spread and straining, electroplating; acid copper plating; acid tin plating; tinning; high-temperature metallizing. (L23, L17; NM-f)

3-L. How Corrosion Is Reduced on Landing Gear Pistons. William L. Aves, Jr. *Plating,* v. 44, Nov. 1957, p. 1175-1179.

Detailed method for applying Zn, Cu, Ni and Cr deposits to aluminum alloy landing gear pistons. Test results from corrosion panels. (L general, R3; Al, *Zn, Cu, Ni, Cr*)

4-L. Lead-Tin Alloy Plating for Aircraft Engine Components. Joseph Azzolino. *Plating,* v. 44, Nov. 1957, p. 1180-1182.

At Curtiss-Wright. (L17; Pb, Sn)

5-L. Vital Role of Plating and Pickling Techniques in the Aircraft Industry. Sam A. Long. *Plating,* v. 44, Nov. 1957, p. 1183-1185.

Techniques at Bell Aircraft. (L12g, L17)

6-L. Practical Aspects of Aluminum Hardcoating. A. W. Sweet. *Plating,* v. 44, Nov. 1957, p. 1191-1196.

Hardness, wear corrosion and abrasion resistance; hard coating equipment; processing details; finished hard coated parts. (L24; Al)

7-L. Antigalling Coatings and Lubricants for Titanium. E. L. White, P. D. Miller and R. S. Peoples. Battelle Memorial Institute, Titanium Metallurgical Laboratory, Report 34. *U. S. Office of Technical Services,* PB 121610, Feb. 1956, 54 p. (CMA)

A survey of methods of reducing the galling type of wear indicates that the bare metal cannot be satisfactorily lubricated. Satisfactory wear performance can be obtained by use of coatings of various kinds plus suitable lubricants. Coatings investigated were oxide, nitride and case hardening; metallic, including Cr, Al, Cu and Ni; and chemical conversion, including phosphate, fluoride-phosphate and anodized coatings. The most successful lubricants tested were of the fluorocarbon type. (L general, Q9; Ti, NM-h)

8-L. (French.) Electrolytic Deposits of Rhodium. *Galvano,* v. 26, Sept. 1957, p. 27-36.

Comparative merits of sulphate and phosphate solutions; barrel coating; applications of rhodium coatings in decorative field; mechanical, physical and optical properties of Rh; formulas for coating solutions; removal of Rh deposits. (L17; *Rh*)

9-L. (Italian.) Anodic Polychrome Oxidation by the Silk Screen Process. *Alluminio,* v. 26, Sept. 1957, p. 383-389.

Principles of silk-screen printing; step-by-step procedure for smooth, engraved and raised designs in two, three or more colors; inks and their characteristics; practical hints on printing and engraving techniques, solutions. Excellent results on superpure Al and "Reflectal" alloys. 6 ref. (L26b; Al)

10-L. Automatic Resurfacing of Steel-Mill Rolls by Welding. A. Smarcan. *Brown Boveri Review,* v. 44, June-July, 1957, p. 276-285.

Causes of wear; methods of reconditioning mill rolls; shape and material of rolls; electrode material; surfacing process; shop procedure for roll reconditioning; installations in which automatic arc welders are being used. (L24, W23k)

11-L. These Aluminum Enamels Resist Corrosion by Boiling Alkaline Water. B. W. King, W. H. Duckworth, John Schultz and H. P. Tripp. *Ceramic Industry,* v. 69, Oct. 1957, p. 82-85.

Enamels for 2S Al were developed with corrosion rates about 1/75 that of base Al in boiling alkaline water for 100 hr. Enamels are based on Na_2O-PbO-SiO_2 eutectic composition, with substitutions of a total of 10 to 15% of TiO_2, ZrO_2 and alkaline earth oxides for PbO and Na_2O. About 1% NiO was beneficial for promoting adherence. (L27, R4f; Al)

12-L. What Every Aluminum Enameler Should Know. Paul A. Huppert. *Ceramic Industry,* v. 69, Oct. 1957, p. 86-87.

De-enameling technique, dangers of repeated firing, toxicity of materials used in pre-enameling and enameling process, toxicity of finished products, uses of reclaimed enamels, housekeeping in enameling plants. (L27; Al)

13-L. Protection of a Sulphonating Plant. T. P. Barling. *Corrosion Prevention and Control,* v. 4, Oct. 1957, p. 61-63.

Corrosion prevented by resin-based paints. (L26p)

14-L. Wetting Agents in Metal Treatment. J. K. Aiken and D. K. Howard. *Corrosion Technology,* v. 4, Sept. 1957, p. 318-319, 332.

Wetting agents for use in acid pickling, alkaline cleaning, electroplating, phosphating or other metal treating solutions. (L12, L14b, L17)

15-L. Polytetrafluoroethylene Dispersions for Metal Finishing. E. M. Elliott. *Institute of Metal Finishing, Transactions,* v. 33, 1955-1956, p. 355-369.

Applied by brushing, dipping, but more generally by spray coating. Surfaces have high heat resistance, low coefficient of friction, anti-adhesive properties and reasonable resistance to chemical attack. Toxic fumes are given off during processing. 9 ref. (L26p)

16-L. Experiences and Problems in the Surface Treatment of Die-Castings. Pt. 2. Cleaning, Painting, Chemical Treatments. W. Ruegg. *Metal Industry,* v. 91, Nov. 1, 1957, p. 375-377.

(To be continued.) 13 ref. (L12, L26; 5-61)

17-L. Chromium Gives New Life to Crankshafts. Plating With Chromium Stands up Under Heavy Service. *Modern Railroads,* v. 12, Oct. 1957, p. 115-116.

In diesel locomotives. (L17; *Cr*)

18-L. (German.) **Galvanizing of Aluminium.** H. W. Dettner. *Aluminium,* v. 32, Oct. 1957, p. 665-668.

Oxide films which cause difficulty in galvanizing are dissolved and replaced by a film of Cu, Zn, Ni or Fe, deposited by ion exchange, as a basis for adhesion of other metal coatings. 25 ref. (L16; Al, *Zn*)

19-L. (German.) **New High-Speed Method for Hot Tin Plating of Thin Copper Wires.** O. Haugwitz. *Draht,* v. 8, Aug. 1957, p. 336-339.

New machine has speeds up to 5500 ft. per min. high speed, which leads to cost-reduction, is dependent on cleanness of wire surface, pickling agent, wire diameter, bath temperature. (L17, 1-52; Cu, *Sn,* 4-61)

20-L. (German.) **Exhaust and Sealing Hoods Over Chemical Baths for Surface Treatment of Metals.** G. W. Mazurzak. *Draht,* v. 8, Aug. 1957, p. 344-349.

Wire pickling installations can be improved through reduction of the surface contact between bath and outside air. 6 ref. (L12g; 1-52; ST, 4-61)

21-L. (German.) **Centrifugal Polishing.** E. Knuth-Winterfeldt and Ulf Langer. *Metalloberfläche,* v. 11, Aug. 1957, p. 253-254.

Steel specimens to be polished were subjected to a chemical treatment in a mixture of oxalic acid and hydrogen peroxide and then were centrifuged. Advantages are faster polishing, lower temperatures and less pitting. (L10b; ST)

22-L. (German.) **Interruption of Zinc Plating.** H. Bablik, F. Gotzl and E. Nell. *Metall,* v. 11, Aug. 1957, p. 649-651.

Frequently shadows appear on the surface after zinc plating. In these zones zinc-iron alloys rather than pure zinc constitute the surface layer. The reaction speed between iron and zinc is higher than normal resulting in the absorption of the pure

zinc layer during and after plating. Unfavorable rolling conditions can also be blamed. Possible remedies are pickling of the unplated iron sheets and addition of aluminum to the zinc bath. 3 ref. (L17; *Zn*)

23-L. (German.) Effects of Ball Polishing in Surface Treatment. M. Dreher. *Metall,* v. 11, Sept. 1957, p. 752-754.

Materials, form of pieces, surface roughness and surface treatment before polishing; length of polishing operation; obtainable surface finish; economics of the process. 4 ref. (L10d)

24-L. (German.) On the Nature, Composition and Electrical Properties of Oxide Coatings on Electrolytic Condensers. L. Holik and H. Nowotny. *Metall,* v. 11, Sept. 1957, p. 737-740.

Differences in the nature of oxide coatings on Al foils after electrochemical oxidation in relation to initial conditions and the process of formation. Properties of crystallized gamma and amorphous oxides. 6 ref. (L14a, P15; Al, 4-56)

25-L. (German.) Chemical Surface Protection of Light Metal. A. Pollack. *Metall,* v. 11, Sept. 1957, p. 754-756.

Chemical surface protection is preferred to electrochemical processes; it is simpler and more economical and affords good protection against corrosion when used as a base for lacquer coatings. 17 ref. (L14; Al, Mg)

26-L. (German.) Electrolytic Polishing of Metals. H. Mohlberger. *Metall,* v. 11, Sept. 1957, p. 756-761.

Influence of the flow velocity of the electrolyte upon the form of the ampere-voltage curves and their interpretation; electrolytic polishing of copper and brass in phosphoric acid; theories on the mechanism of metal brightness. 29 ref. (L13p)

27-L. (German.) Present State of Electroplating. Willibald Machu. *Stahl und Eisen,* v. 77, Oct. 3, 1957.

Surface preparation, pickling, grinding, polishing, rectifiers, baths. 77 ref. (L17, L general)

28-L. (German.) Spent Pickling Solutions. Kurt Mathesius. *Stahl und Eisen,* v. 77, Oct. 3, 1957, p. 1349-1355.

Methods of recovering suphuric acid, conversion to iron sulphatemono and heptahydrate; mechanical descaling; consumption of sulphuric acid in the iron industry. 14 ref. (L12g, A8b)

29-L. (German.) Acid Copper Plating and the "Cupatier" Process. W. Strauss and E. Roth. *Metalloberfläche,* v. 11, Sept. 1957, p. 281-285.

Very bright copper finishes can be obtained by lowering the working temperature, increasing the suphuric acid content in the electrolyte, increasing the current density, selection of suitable inhibitors. Surface hardness, ductility and corrosion resistance were improved, permitting direct copper plating of iron. Working procedures. 8 ref. (L17, Fe, *Cu*)

30-L. (German.) Problem of Current Distribution in Concentrated Electrolytes. P. Csokan. *Metalloberfläche,* v. 11, Sept. 1957, p. 285-288.

A new method for observing current distribution. (To be continued.) (L17)

31-L. (German.) The "Kolene" Process—a Salt Bath Process for Cleaning Metal Surfaces. K. Falkenmayer. *Metalloberfläche,* v. 11, Sept. 1957, p. 297-304.

Descaling of hot and cold formed pieces, removal of sand and graphite residues from castings, stripping of paint. 21 ref. (L12n)

32-L. (Russian.) Effect of Galvanizing in Cyanide Electrolyte on Mechanical Properties of Steels. I. I. Moroz and N. I. Kudryatsev. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 28-33.

Tough steels are subjected to a greater degree of change than softer ones. This may be explained by the tougher steel's absorbing more hydrogen from the electrolyte. (L16, Q general; ST, *Zn*)

33-L. (Russian.) Galvanizing With Zinc Phosphate Electrolyte. A. V. Rikova and E. I. Rudoi. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 33-37.

The zinc coating obtained has strong anti-corrosion properties and may be used as an undercoating for Cr plating. (L16, *Zn*)

34-L. (Russian.) Surface Boronization of Low-Alloy Steels. V. D. Taran and L. P. Skurova. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 45-47.

Quality of the boronized layer depends on the temperature of the electrolyte and duration of the treatment. 6 ref. (L17; AY, *B*)

35-L. (Russian.) **Tin Economy in Production of White Tinplate.** M. S. Arkhipova, V. D. Mishin and N. S. Smirnov. *Metallurg,* v. 2, July 1957, p. 30-34.

Three original methods of tin recovery in tinplating.
(L17, A11d; Sn)

36-L. Multi-Roller Burnishing: Short Cut to a Fine Finish. M. J. Delany, Jr. *American Machinist,* v. 101, Oct. 21, 1957, p. 156-159.

(L10b)

37-L. At 3000 F. . . . CRS + Chromecase Outlasts Stainless Steel 5 to 1. William M. Stocker, Jr. *American Machinist,* v. 101, Nov. 18, 1957, p. 162-163.

Heat resistance for searchlight parts is achieved by diffusing Cr into the surface. (L15; 8-22; Cr)

38-L. Coating Technique Gets a Boost: New Process Uses Electrophoretic Deposition, Gives a Hard, Bright Molybdenum Coating. *Chemical and Engineering News,* v. 35, Dec. 2, 1957, p. 48.

(L19p; Mb, *SS, Ni*)

39-L. The British Iron and Steel Research Association. Pt. 2. Protective Measures. J. C. Hudson. *Corrosion Technology,* v. 4, Oct. 1957, p. 349-353, 362.

Evaluation of methods for protecting steel structures from atmospheric corrosion; priming paints and effect of film thickness, conditions of application, meteorological conditions; protection by metallic coatings. (L26n, L general; ST)

40-L.* Electroplating From the Pyrophosphate Bath. Pt. 1. Electrodeposition of Single Metals. T. L. Rama Char. *Electroplating and Metal Finishing,* v. 10, Nov. 1957, p. 347-349.

Sn, Cu, Zn, Ni and Pb can be satisfactorily plated from pyrophosphate solutions; optimum operating conditions. The bath may also be useful for the electrodeposition of Co and Fe and possibly of other metals. 29 ref.
(L17a; Sn, Cu, Zn, Ni, Pb)

41-L. Compressed Air and Its Application in Metal Finishing. James Robertson. *Electroplating and Metal Finishing,* v. 10, Nov. 1957, p. 366-373.

Supply and distortion of compressed air. (To be continued.)
(L general, 1-52, 1-71)

42-L.* Enamelling of Aluminium. A. Biddulph. *Foundry Trade Journal,* v. 103, Nov. 21, 1957, p. 603-608.

Enameling of sheet and castings. Basic requirements; metal preparation; oxidizing; procedure to follow when treating castings; milling of enamels and their application; drying; fusing; and enamel composition. (L27; Al)

43-L. Test Hard Surfacing Materials Yourself. D. B. Rankin. *Industry and Welding,* v. 30, Sept. 1957, p. 46-47, 67.

Suggestions for choosing and welding hard surfacing alloys. (L24)

44-L. Cladding on Carbon Steel Opens New Field to Titanium. R. C. Bertossa. *Iron Age,* v. 180, Oct. 31, 1957, p. 59-62. (CMA)

Cladding via a special adaptation of vacuum-furnace brazing.
(L22, K8; ST, Ti, *Li*)

45-L.* Spraywelding—a Hard Facing Preventive Maintenance Process. J. R. Smith. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 90-95.

Preparation of surface to be treated, spraying the surface with metal powder, fusing the overlay by means of controlled atmosphere furnace or oxy-acetylene torch, mechanical properties of Ni-base alloys used as spray-weld overlay, advantages and metals which may be spray welded. (L24; Ni)

46-L. Silicon Protective Coatings for the Steel Industry. R. C. Hedlund. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 109-112.

Silicon resin-base finishes excel where heat, weather or moisture resistant coating is needed for protection of industrial structures.
(L26c)

47-L. Weirton Steel Places Additional New Facilities Into Operation. *Iron and Steel Engineer,* v. 34, Nov. 1957, p. 148-155.

New continuous cleaning and annealing line in the tin mill department and a new continuous coil galvanizing line at Weirton Steel Co.
(L12, L16, J23; ST, *Zn*)

48-L. Gage Tightens Control of Wire Coating Process. *Iron Age,* v. 180, Nov. 21, 1957, p. 132-133.

(L26p, S14, 4-11; Cu)

49-L. Titanium Plating—Where It Stands Today. M. E. Sibert and M. A. Steinberg. *Materials in Design Engineering,* v. 46, Nov. 1957, p. 132-133. (CMA)

Titanium plate on base metals is a method of using the corrosion resistance of titanium while avoiding

its high cost. Fused salt electrodecomposition and fused salt soluble anode methods give good plates. (L17; Ti)

50-L. Science for the Coatings Technologist. Pt. 8. Green Pigments. E. S. Beck. *Metal Finishing,* v. 55, Nov. 1957, p. 50-55.

(To be continued.) (L26n)

51-L.* Practical Metallizing of Technical Ceramics. Raymond C. Steffey. *Metal Finishing,* v. 55, Nov. 1957, p. 56-61.

Preparation of ceramic material for metallizing; applying the conducting film; firing or curing of the metallized pattern; kiln design; electroplating of ceramics, acid Cu and acid Sn plating; high-temperature metallizing. (L23; 6-70)

52-L. Effective Current Density. J. B. Mohler. *Metal Finishing,* v. 55, Nov. 1957, p. 71.

In electroplating. (L17b)

53-L.* Experiences and Problems in the Surface Treatment of Die-Castings. Pt. 3. Electrolytic Processes. W. Rüegg. *Metal Industry,* v. 91, Nov. 15, 1957, p. 422-424.

Electrolytic degreasing; Cu strike baths; bright Cu baths; rinsing and pickling, at Injecta Ltd., Teufenthal, Switzerland. (To be continued.) 10 ref. (L12, L13, L17; 5-61)

54-L.* Electroforming of Telephone Drop Wire Conductor. Robert J. Bachman. *Metal Progress,* v. 72, Nov. 1957, p. 88-92.

Conductance is precisely measured and thickness of metal deposition is controlled as steel wire is coated with Cu, Pb and brass at the rate of 100 ft. per min. (L17, T1b, 17-57; ST, Cu)

55-L. Electroforming of Linear Accelerator Structures. James A. Pope. *Plating,* v. 44, Dec. 1957, p. 1291-1296.

Equipment and techniques used at Stanford University. (L18)

56-L.* Studies on Electroless Nickel Plating. Clara H. de Minjer and Abner Brenner. *Plating,* v. 44, Dec. 1957, p. 1297-1305.

The rate of deposition increased with the pH of the bath, and varied with the nature of the acid used for buffering or complexing of Ni ions. Nickel phosphite precipitated from the bath more readily at higher values of pH. Outdoor exposure tests were made of steel plated with electroless Ni and with electrolytic deposits of Ni and Ni-P alloy. The electroless deposits and the electrolytic Ni-P alloys gave better protection than electrodeposited Ni. 14 ref. (L28; Ni)

57-L. Here Are Advantages of Conversion Coatings. *Precision Metal Molding,* v. 15, Dec. 1957, p. 54-55, 57.

Inorganic films produced on metallic surfaces by chemical reactions with an analysis of the corrosion protection afforded. (L14; ST)

58-L. Pickling Stainless to Remove Scale. W. E. McFee. *Steel,* v. 141, Nov. 25, 1957, p. 103-107.

Seven treatments for varying degrees and types of scale. (L12g; SS)

59-L. New Method to Clean Moly. *Steel,* v. 141, Nov. 18, 1957, p. 158. (CMA)

The first step is a 5-10 min. immersion in an acidic permanganate bath at 150-180° F. to further oxidize the oxides, which are then removed by pressure spray. The second step is a 5-10 min. immersion in an acidic chromate bath to remove the residual smut. (L12g; Mo)

60-L. Formation Fields and Current Efficiencies in the Anodic Oxidation of Zirconium. A Direct Comparison of High-Potential Formation Fields With Those Derived From Low-Potential Changing Curves. G. B. Adams, Jr., Tien-Shuey Lee and Pierre Van Rysselberghe. *U. S. Atomic Energy Commission,* AECU-3500, 1957, 33 p. (CMA)

9 ref. (L19; Zr)

61-L. (Pamphlet.) **Uses of Ceramic-Coated Metals in Small Plants.** Frederick D. Shaw. Small Business Administration. Technical Aids for Small Manufacturers. U. S. Government Printing Office, Washington 25, D. C., July 1957, 4 p.

(L27, 17-57)

62-L.* (German.) **Mechanical Descaling for Steel Bars and Semifinished Steel.** Fritz Schweitzer. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1476-1482.

Different types of shot-blasting; blasting media, cost, defects; wear problems; economic and qualitative results on steel bars and semifinished special steels. (L10c; ST, 4-55)

63-L. (French.) **Influence of the pH of Metallic Surfaces on Paint Adherence.** Claude Hess. *Peintures, Pigments, Vernis,* v. 33, Sept. 1957, p. 798-800.

Types of soil and foreign matter found on untreated surfaces; methods of removal; importance of final rinsing; characteristics of final rinsing bath. (L26)

64-L. (French.) **Electrolytic Oxidation and Galvanic Deposition on Titanium.** H. Richaud. *Revue de Métallurgie,* v. 54, no. 10, 1957, p. 787-792. (CMA)

Effect of various factors (potential, temperature, duration, nature of the electrolyte) on anodic and cathodic treatment of Ti. Formation of oxide layers is a function of time and current density. A natural oxide film on Ti necessitates a preliminary treatment of the surface before electrolytic deposition. (L19; Ti)

65-L.* (French.) **Special Application of Oxy-Acetylene Flame Descaling to the Preparation of Commercial Rolling Mill Products for Spot Welding.** M. Evrard. *Soudage et Technique Connexes,* v. 11, Sept-Oct. 1957, p. 297-317.

Flame heating followed immediately by water-spray cooling eliminates scale and provides necessary surface condition for welding. Influence of flame descaling on mechanical properties and structure of the metal and of spot welds made on steel plate thus treated. 16 ref. (L10g; ST, 4-53)

66-L. (Japanese.) **Anodic Oxidation of Titanium. Pt. 1.** Hisaya Nagasaki and Haruo Ishida. *Light Metals (Tokyo),* no. 25, July 1957, p. 79-85. (CMA)

TiO_2 formed by anodic oxidation is not yet useful as an electrolytic capacitor because it is unstable and current leakage is large. Although aqueous solutions of various salts were used in the anodic oxidation, no stable oxide was formed. A salt bath of 45% $NaNO_3$ and 55% KNO_3 at 250-350° C. and a constant current method gave a film with a low leakage current, a crystallized film with large grains, and significant charge and discharge characteristics. The relationship between capacity, resistivity and voltage of formation was not perfectly linear, and a discontinuity occurred at 35-40 volts. 6 ref. (L19; Ti)

67-L.* (Rumanian.) **Mechanism of Porous Chromium Plating. Pt. A. Study of Porosity.** I. Firoiu. *Revista de Chimie,* v. 8, July 1957, p. 471-479.

Porosity of coatings deposited on steel and copper specimens was studied in terms of density of cathodic current, cathodic processing temperature, concentration of chromic acid, CrO_3/SO_3 ratio, trivalent Cr concentrations, density of anodic current, duration and temperature of anodic processing. Deposits were examined by microscope. 19 ref. (L17, P10m; ST, Cu, *Cr*)

68-L.* (Rumanian.) **Mechanism of Porous Chrome Plating. Pt. B. Study of Internal Stresses.** I. Firoiu. *Revista de Chimie,* v. 8, Sept. 1957, p. 574-579.

Internal stresses in steel and copper specimens as influenced by density of cathodic current, bath temperature, concentration of chromic acid. 12 ref. (L17, Q25; *Cr*)

69-L.* **Influence of Chloride Ions on the Solution of a Nickel Anode.** A. V. Pomosov and L. I. Gurevich. *Journal of Applied Chemistry of the USSR.* v. 29, Sept. 1956, p. 1475-1479. (Translated by Consultants Bureau, Inc.)

Three characteristic regions of the action of chloride ions on passivation of Ni anodes have been found. In the current density region up to 4.2 A. per sq. dm. with 0.5 g-equiv. per liter of sodium chloride in the bath, Ni anodes dissolve without hindrance; addition of 0.02-0.1 g-equiv. of chlorides per liter favors anode passivation and induces transitory (periodic) passivity. The passivating action of chloride ions is explained by the formation of hypochlorous acid in secondary reactions. 5 ref. (L17a; *Ni*)

70-L. **Metal Spraying in Inert Atmospheres.** R. E. Monroe, D. C. Martin and C. B. Voldrich. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI 894, 21 p.

Zirconium coatings on uranium. (L23; *Zr,* U)

71-L. **Research on the Electrodeposition of Zirconium, Niobium and Vanadium From Nonaqueous Media.** A. P. Beard, D. H. Ahmann and F. J. Shipko. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-798, Aug. 22, 1952, 7 p. (CMA)

9 ref. (L17; Zr, Cb, V)

72-L. **Bonding of Uranium and Zirconium Alloys.** H. D. McIntire, H. J. Hucek and G. K. Manning. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-781, Oct. 23, 1953, 18 p. (CMA)

Fabricating conditions for roll cladding Zr and U alloys. (L22; U, Zr)

73-L. Vapor Deposited Zirconium on Uranium. C. F. Powell, et al. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1018, July 20, 1955, 30 p. (CMA) (L25k; U, Zr, *Cr*)

74-L. (French.) **Treatment of Aluminum and Aluminum Alloys Surfaces by Electrochemical Means.** F. Flusin. *Bulletin de la Société Francaise des Electriciens,* v. 7, Sept. 1957, p. 553-560.

Pickling, polishing, anodic oxidation, cathodic oxidation. (L19, L21, L13n, L12g; Al)

75-L. (French.) **Treatment of Superficial Structure of Metals by the "Sulfinusation" Process.** Charlotte Buckle, Robert Courte, Robert Desbrandes and Louis Pons. *Comptes Rendus,* v. 245, Sept. 30, 1957, p. 1120-1121.

Diffusion zone some tenths of a millimeter from the surface with precipitates in pearlite and ferrite. (L15; *S*, ST)

76-L.* (Portuguese.) **Metallurgical Characteristics of Tinplate Manufactured by Cia. Siderurgica Nacional.** Pedro Silva. *ABM, Associacao Brasileira de Metais, Boletim,* v. 13, July 1957, p. 215-244.

Process details at Volta Redonda Works from rolling of ingots up to and through dip and electrolytic plating processes; characteristics and applications of tinplate produced. 5 ref. (L17; *Sn*, ST)

77-L.* **New Plating Process for Corrosion and Wear Resistance.** *Industrial Finishing (London),* v. 9, Nov. 1957, p. 921-926.

Chemical process (Kanigen) deposits a hard, uniform, nonporous and highly corrosion and wear resistant Ni-P alloy with a number of unusual properties. (L28; *Ni*)

78-L. American Practice in Stainless Steel Finishing. *Industrial Finishing (London),* v. 9, Nov. 1957, p. 930-934.

Compared with British practice. (L general; SS)

79-L. Conditioning and Painting the Surfaces of Zinc Coated Steels. Lester F. Spencer. *Industrial Finishing,* v. 34, Dec. 1957, p. 28-35.

Cleaning; coating with paint, enamels and laquers. (L12h, L26; ST)

80-L. Science for the Coatings Technologist. Pt. 8. Green Pigments. E. S. Beck. *Metal Finishing,* v. 55, Dec. 1957, p. 61-62, 66.

14 ref. (L26n)

81-L. When to Use Solvent-Vapor Degreasing. C. E. Kircher. *Metal Finishing,* v. 55, Dec. 1957, p. 63-64. (L12j)

82-L. Metal Spraying—Development and Application. S. J. Oechsle, Jr. *Metal Finishing,* v. 55, Dec. 1957, p. 67-71, 76. (L23)

83-L. Finishing Pointers. Unconventional Chromium Plating. J. B. Mohler. *Metal Finishing,* v. 55, Dec. 1957, p. 75-76. (L17; *Cr*)

84-L. How to Specify Colorful, Functional, Economical and Pre-Painted Steel. Ford R. Park. *Product Engineering,* v. 28, Dec. 9, 1957, p. 99-102. (L26n; ST)

85-L. (Italian.) **Bright Nickel-Plating: Research on the Influence of Organic Addition Agents.** Eugenio Bertorelli, Ignazio Bellobono and Corrado Bordonali. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. 1, 1957, p. 55-67.

Principal bright Ni-plating processes and theories. Results of adding to the bath organic substances of the oxy-benzaldehyde series, pyridine and acetylene derivatives. Influence of saccharine. Bright deposits are interpreted as result of intermediate formation in the cathodic adsorption film of a particular type of activated compound which favors deposition of nuclei smaller than length of a light wave. Effect of saccharine is explained as homogenization of adsorption film. 35 ref. (L17a; *Ni*)

86-L. (Italian.) **Montecatini "Bonders" for Phosphate Coating of Metals.** Federico Arborio Mella. *Pitture e Vernici,* v. 13, Sept. 1957, p. 600-602.

Theoretical principles of phosphate coating process. (L14b)

87-L.* **Effect of Firing Schedules on Stress-Temperature Relations in Enamel-Metal Systems.** J. H. Lauchner, R. L. Cook and A. I. Andrews. *American Ceramic Society, Journal,* v. 40, Dec. 1, 1957, p. 410-415.

Effect of box and continuous enameling furnace firing schedules on the thermal deflection of enameled iron strips was studied. Effective coefficient of thermal ex-

pansion values were calculated from coefficient of thermal deflection data. Results indicate that the effective thermal expansion values for annealed and unannealed enameled iron agree with the expansion data obtained by an interferometer study of the same enamels. Variation in the cooling rate of the enameling furnaces is sufficient to produce marked change in the development of thermal stress in the enameled iron. Residual compressive stresses in the enamel are increased by rapid cooling from firing temperatures. Tensile stress developed in the enamel during reheating is reduced by previous annealing. (L27, Q25, P11g; CI)

88-L.* Descaling Bath for Titanium. *Automotive Industries,* v. 117, Dec. 1957, p. 130-132.

TEMCO Aircraft Corp. has developed and patented "Ti-Brite" process of scale removal that avoids damage to base metal. (L12; Ti)

89-L. Reconditioning Aircraft Parts With Molten Salt Bath. *Industrial Heating,* v. 26, Nov. 1957, p. 2294-2296.

Versatile cleaning process developed by Kolene Corp. (L12n, T24)

90-L.* The HAE Process to Date. *Light Metal Age,* v. 15, Dec. 1957, p. 10-14.

Electrochemical process on Mg alloy produces a nonmetallic coating possessing excellent corrosion and abrasion resistance properties. (L17; Mg)

91-L. Examples of Results Obtained by Barrel Finishing. *Machinery,* v. 91, Oct. 11, 1957, p. 862-863.

Processing time and results with both ferrous and nonferrous components. (L10d)

92-L.* Technical Developments of 1957. Nathaniel Hall. *Metal Finishing,* v. 56, Jan. 1958, p. 40-49.

Comprehensive literature review. 354 ref. (L general, A9)

93-L.* Organic Finishing Developments of 1957. Daniel A. Marino. *Metal Finishing,* v. 56, Jan. 1958, p. 50-52.

Literature review. 70 ref. (L26, A9)

94-L.* Firm Adherent Plating for Aluminum. J. C. Withers and P. E. Ritt. *Metal Finishing,* v. 56, Jan. 1958, p. 53-54, 57.

A new method produces a thin coating of Ni on the surface of the Al. Heat treating forms a suitable base upon which any subsequent metal can be plated with perfect adhesion. (L17; Al)

95-L. Electroplating 22 Karat Gold-Silver Alloy. R. E. Harr and A. G. Cafferty. *Metal Finishing,* v. 56, Jan. 1958, p. 55-57.

(L17; Al, *Au, Ag*)

96-L.* An Introduction to Wash Primers. Pt. 1. *Metal Finishing,* v. 56, Jan. 1958, p. 58-60.

Analysis of various types of primers with special reference to WP-1. Plain steel test panels coated with wash primer revealed great corrosion resistance. (To be continued.) (L26; CN)

97-L. Some Aspects of Zinc, Copper, Nickel and Chromium Plating. L. Ades. *Metal Finishing Journal,* v. 3, Dec. 1957, p. 477-484, 496.

Deals with composition and operation. (L17; Zn, Cr, Cu, Ni)

98-L.* Direct Chloride Process for Tinning Cast Iron. C. J. Thwaites and J. J. Day. *Metallurgia,* v. 56, Dec. 1957, p. 263-270.

Newly developed process gives adequate adhesion to white metal bearing alloys, provided that fine grit is used for shot blasting and an ebullient flux layer covers the first tinning bath. Influence of the composition and structure of the cast iron, preliminary surface treatment and tinning and whitemetalling conditions. 7 ref. (L16; CI, *Sn,* SGA-c)

99-L.* Deposition of Metals Other Than Those of the Titanium Group by the Hot Filament Technique. R. A. J. Shelton. *Metallurgia,* v. 56, Dec. 1957, p. 283-289.

Deposition of V, Cb, Cr, W, Mo, Re, Fe, Os, Pt, Cu, Be and U. 27 ref. (L25)

100-L. Vacuum Coating at V.M.C. Ltd. *Product Finishing (London),* v. 10, Nov. 1957, p. 98-101.

(L23, 1-73; Al)

101-L. Cadmium Plating: How to Avoid Embrittlement. *Steel,* v. 141, Nov. 11, 1957, p. 132-134.

(L17a, Q26s; ST, *Cd*)

102-L.* Mechanized Surfacing With Alloy Materials. R. S. Zuchowski and J. H. Neely. *Welding Journal,* v. 37, Jan. 1958, p. 22-29.

Inert-gas tungsten-electrode hard surfacing with the addition of tungsten carbide powder; inert-gas consumable-electrode process with cold wire addition; and submerged-arc surfacing with any one of several techniques and with or without powder-alloy addition. (L24)

103-L. Metallurgical Surface Treatment of Tinplate Produced in Liskovec, Czechoslovakia. J. Teindl and A. Hrbek. *Hutnické Listy,* v. 12, no. 4, 1957, p. 329-332. (Henry Brutcher Translation no. 4042, Altadena, Calif.)

Previously abstracted from original. See item 300-L, 1957. (L14a, Sn, 8-62)

104-L. (Norwegian.) Anodic Treatment. Norwegian Aluminum Co. *Teknisk Ukeblad,* v. 104, Oct. 17, 1957, p. 4 of attachment.

Application of color to Al surfaces by anodic treatment. (L19; Al)

105-L. (Russian.) Mechanization of Sandblast Lines. P. N. Aksenov. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 15-18.

Brief review of 13 works recently published in the USSR and abroad dealing with theoretical and engineering aspects of sandblast machinery. (L10c, W2r)

106-L.* Aluminum Sheathing of Flat Uranium by Extrusion Cladding. A. J. Mooradian. *Atomic Energy of Canada Ltd.,* CRL-46. 27 p. 1957.

The Al sheathing of long flat U metal fuel elements by extrusion cladding has been developed to the point of trial production. The process consist of using the U flat as a moving mandrel over which the sheath is extruded directly, thereby completely encasing the U with Al as it passes through the die. Bonding of the sheath to the core may be achieved in the course of extrusion. The bond is stronger and more uniform in the case of a U plate which has been Ni-plated than in the case of bare uranium. However, in both cases, the sheath is found to be in good sonic contact with the core. Both Ni-plated and bare U flat elements sheathed in Al by the extrusion cladding method have been successfully tested under irradiation. There was no evidence of poor thermal transmission through the U-Al interface under the test condition of 47 watts per sq. cm. This method was developed for cladding flat plates used in making up reactor fuel rods. (L22, F24; U, Al)

107-L. Precision Barrel Finishing. Pt. 6. William E. Brandt. *Automatic Machining,* v. 19, Nov. 1957, p. 59-64.

Application of barrel finishing and tumbling to screw machine products; equipment, media and barreling procedure for descaling, deburring and finishing a variety of screw-machine parts. (L10d, 1-52)

108-L. Weld Hard Facing Materials. W. A. Martin. *Canadian Metalworking,* v. 20, Nov. 1957, p. 58-64.

Welding with hard-facing materials has become the recognized method of dealing economically with problems of metallic wear. (L24; CI, ST)

109-L. Variables Affecting Validity of Accelerated Coating Tests. *Corrosion,* v. 14, Jan. 1958, p. 124-130.

The principal cause of discrepancy is failure to take into account all variables in factors which affect coating performance. Factors are the environment, type of surface and its preparation, care and uniformity of application. (L general, 1-54)

110-L. Masking Film Put on by Dipping. William L. Timm. *Industrial Finishing,* v. 33, Oct. 1957, p. 62-68.

Conveyorized dip coating setup used to apply temporary over-all coating of masking material to metal parts which are to be chemically milled. (L26p, G24b)

111-L. U. S. Develops Ceramic-Type Coatings for Aluminum. John B. Franklin. *Industrial Finishing, (London),* v. 9, Oct. 1957, p. 862-863.

Process involves immersion of clean Al parts in chilled electrolyte and use of 15 to 20 v. at 12 to 15 amp. per sq. ft. between parts and metal tank. Oxide coatings formed are heavier than those obtained by conventional anodizing. (L19; Al)

112-L. Ceramic Coatings Raise Heat Resistance of Super-Alloys. P. A. Huppert. *Iron Age,* v. 180, Nov. 14, 1957, p. 157-159.

Ceramic coatings for protection of superalloys at elevated temperatures, physical properties of ceramic lithium compound and boron nitride. (L27; SGA-h, Li, B)

113-L. New Process Makes Nylon Coatings Possible. *Iron Age,* v. 180, Nov. 14, 1957, p. 160-161.

Process for applying nylon coatings to metal. (L26p)

114-L. Finer Finishes Mean Added Operations. *Metal Removing,* v. 2, Nov. 1957, p. 18-19.

Burnishing methods. (L10b)

115-L.* How to Barrel Finish Eggs. William Biebel. *Plating,* v. 45, Jan. 1958, p. 31-34.

Control of the six variables involved in size of media, speed of the barrel, mass height, water level, ratio of work to media and selec-

tion and use of compound, permit the barrel finishing of eggs and equally delicate parts. (L10d)

116-L.* Liquid Vs. Bar Buffing Compound. E. T. Candee. *Plating,* v. 45, Jan. 1958, p. 35-38.

Advantages of liquids over bars include: Liquids lend themselves to automatic and machine buffing because of infrequent operational interruption to replenish the supply of compound; danger in handling and replacing of bars of the machine in operation is eliminated; liquids lend themselves to many formulations which are not possible to produce in bar form. (L10a)

117-L.* Abrasive Wet Blasting for Cleaning and Finishing Metals. Alan R. Burman. *Plating,* v. 45, Jan. 1958, p. 45-48.

Process is performed with the utilization of a compressed air blasting gun to "throw" a mixture of water and abrasive. Water as the carrying medium allows the use of an extremely wide choice of abrasives; quartz, silica flour, novacite, aluminum oxide, silicon carbide, etc., ranging in particle size from 75 to 5000 mesh. (L10c)

118-L. Let's Cut Finishing Costs. Leland H. Vorce. *Plating,* v. 45, Jan. 1958, p. 50-51.

Current practice in large plating plants involves the most modern backstand equipment, newly improved contact wheels and recently developed resin-bonded abrasive belts as well as newer lubricants. (L10, W2n, W2p)

119-L. Hot-Dipped Aluminum Coatings. Herbert L. Kee. *Product Engineering,* v. 28, Oct. 28, 1957, p. 57-59.

Notes on base materials, both ferrous and nonferrous, to which hot dipped Al coatings can be applied. Corrosive conditions they resist and specific application of coated parts. (L16; Al)

120-L.* Barrel Silver Plating. I. J. Warwick. *Product Finishing,* v. 10, Oct. 1957, p. 61-65.

Chief application of silver plating by barreling. Main types of plating barrels, including semi-immersed, totally immersed and oblique models; electrical current requirement, recommended pretreatment and solutions for barrel plating. (L17, W3b; Ag)

121-L. Phosphating Processes and Their Applications in Metal Finishing. Pt. 5. Process Control. D. J. Fishlock. *Product Finishing,* v. 10, Oct. 1957, p. 84-93, 120.

Method of controlling phosphating processes including solution control and coating control. 18 ref. (L14b)

122-L. Nickel Sulphamate Plating. E. Calderon. *Product Finishing,* v. 10, Dec. 1957, p. 81-83. (L17a; Ni)

123-L. Flame Spray Fights Wear and Corrosion. Hoyt Todd. *Welding Engineer,* v. 42, Nov. 1957, p. 37-38.

Results obtained with flame spraying powdered nickel alloys through oxy-acetylene flame and fusing sprayed coatings. (L23; Ni)

124-L.* (Italian.) **Painting of Aluminum and Its Alloys.** *Alluminio,* v. 26, Nov. 1957, p. 489-500.

Techniques and materials; inspection methods. 9 ref. (L26; Al)

125-L. (Russian.) **Protective and Decorative Chromium-Plating of Aluminum Ware.** V. I. Lainer and Yu. A. Velichko. *Vestnik Machinostroeniya,* v. 37, Sept. 1957, p. 48-54. 6 ref. (L17; *Cr,* Al)

126-L.* Anomalies in the Growth of Anodic Oxide Films on Rough Surfaces. L. Young. *Acta Metallurgica,* v. 5, Dec. 1957, p. 711-716.

During the growth of anodic oxide films, surface irregularities of the scale of the thickness of the oxide film are believed to be flattened. The original inner layers of the oxide (new layers are formed on the outside, since metal ions move) are, therefore, constrained to cover a progressively smaller area. The resultant compressive stresses will produce failure if the original metal surface is rough enough. It has been confirmed that with such surfaces progressively less charge is required to form oxide to a given potential at a fixed current density. 21 ref. (L19)

127-L. Barrel Finishing Cuts Costs. *Automatic Machining,* v. 19, Dec. 1957, p. 50-52. (L10d)

128-L. Chemical Surface Preparation of Structural Steel After Erection. Christopher D. Coppard, John H. Lawrence, F. S. Bricknell and Henry W. Adams. *Corrosion,* v. 13, Nov. 1957, p. 141-142. (L14b; ST)

129-L. Epoxy Coatings Perform Well on Steel Exposed to Chemicals, Corrosive Atmospheres. William M.

Brackett. *Corrosion,* v. 13, Nov. 1957, p. 144-146.

(L26p, R3, R6; ST)

130-L. Controlling Corrosion of Textile Mill Air Conditioning Equipment. J. Livingstone. *Corrosion,* v. 13, Nov. 1957, p. 147-148.

Use of zinc-base paints.
(L26n; R3)

131-L. Electroplating From The Pyrophosphate Bath. Pt. 2. Electrodeposition of Alloys. T. L. Rama Char. *Electroplating and Metal Finishing,* v. 10, Dec. 1957, p. 391-392, 408.

Methods used for electrodeposition of many alloys. 15 ref. (To be continued.) (L17)

132-L.* Recent Developments in Copper Plating. D. E. Weimer. *Institute of Metal Finishing, Bulletin,* v. 7, Autumn 1957, p. 13-14.

Application and deposit characteristics of Cu required in decorative electroplating. Research and developments directed toward overcoming problems in electrodeposition of Cu from cyanide and acid sulphate solutions. Characteristics and properties of pyrophosphate Cu solution and deposits obtained from it. 15 ref. (L17; *Cu*)

133-L. Vacuum Deposition Avoids Embrittlement. V. Dress. *Iron Age,* v. 180, Dec. 19, 1957, p. 142-145.

Cadmium coatings on steel aircraft parts do not develop hydrogen embrittlement but meet all military specifications for adherence, corrosion resistance, coating thickness and uniformity.
(L25g, Q26s, *Cd,* ST)

134-L. Vitreous Enamelling Aluminium. *Light Metals,* v. 20, Nov. 1957, p. 354-356.

(L27; Al)

135-L. Production of Enamelling and Zinc-Coated Steel Sheets. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 401-407.

Facilities and operation in a British plant producing steel sheets and strips suitable for vitreous enameling or galvanizing. Continuous line for hot dip coating strip. Sequence in coating sheets by electrozinc process. (L27, L17; 4-53; ST *Zn*)

136-L. Enamelling of Aluminium. A. Biddulph. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 418-424.

Cleaning and preparation of Al sheets, extrusions or castings. Routine in milling Al enamel frit; application of coat, drying and fusing. (L27; Al)

137-L.* Some Advances in Tinplate Technology. W. E. Hoare. *Metal Progress,* v. 73, Jan. 1958, p. 91-96.

Tighter thickness tolerances, annealing for both stiffness and ductility, improved tinning machinery (both electrolytic and "roller coatings"), electronic control of high-speed lines, new devices for rapid estimation of corrosion resistance. (L17, L16, F23, ST, Sn)

138-L. Multi-Roll Burnishing Gives Fine Finish. M. J. Delany, Jr. *Metalworking Production,* v. 101, Nov. 22, 1957, p. 2093-2096.

(L10b; ST)

139-L. "Stress Free" Plating Brings Benefits. Edward Calderon. *Metalworking Production,* v. 101, Dec. 20, 1957, p. 2268-2269.

Aircraft components are salvaged and quality improved with nickel sulphamate plating bath.
(L17a, T24; *Ni*)

140-L.* Effect of Addition Agents on the Plating of Nickel. A. Goswami. *Scientific and Industrial Research, Journal,* v. 16B, July 1957, p. 315-317.

The effect of addition agents and brighteners on cathodic crystal growth in a Watt's type of Ni-plating bath with a pH favorable to lateral growth has been studied by electron diffraction. Addition agents producing a high cathode polarization result in outward growth deposits. 11 ref. (L17a; *Ni*)

141-L.* Decoration of Tinplate by Roller Coater and Offset Tinprinting Machine. J. M. Boyle and J. Matthews. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 35-46.

Metal decoration on flat sheets of tinplate or steel which are to be fabricated after the decoration is complete. Techniques, materials and their control, equipment, the automatic tinplate feeder and run-in, the roller coater, the conveyor oven and the automatic oven unloader, and the printing machines. (L26b; ST, *Sn*)

142-L. Barrel Finishing Operation Improves Fatigue Strength of Jet Engine Parts. J. D. Marble and C. V. Ruehrwein. *Tool Engineer,* v. 39, Nov. 1957, p. 99-101.

Compares surface finish and fatigue strength of AISI 4130 steel subjected to different finishing processes; barrel finishing selected as

preferable to shaping, grinding, hand polishing, electrolytic grinding or electrodischarge machining. (L10d, T24b; ST)

143-L. Planning Barrel Finishing Operations. Ralph F. Enyedy. *Tool Engineer,* v. 39, Dec. 1957, p. 105-107. (L10d)

144-L. Found: Deoxidizing Process to Clean Molybdenum for Welding. Edwin R. Calderon. *Western Metalworking,* v. 15, Dec. 1957, p. 61-62. (L12; Mo)

145-L.* (French.) **Use of Flux in Galvanizing.** A. Herz. *Metallurgie et la Construction Mecanique,* v. 89, Nov. 1957, p. 955-957.

Spelters and their properties; Hachmeister's equilibrium diagram; loss of Zn; fluxing in double salts; cover fluxing. (L16; *Zn,* RM-q)

146-L. (German.) **Electrolytic Polishing of Metals.** *Chemische Rundschau,* v. 10, Oct. 11, 1957, 3 p.

Methods; comparison with mechanical polishing; application to Fe and its alloys, Al and noble metals. (L13p; Fe, ST, Al, EG-c)

147-L. (German.) **Zinc Dust Protective Coatings With Electrically Conductive Adhesives.** Martin Kuhn, Otto Breier, Anneliese Otto and Peter Weidiich. *Farbe und Lack,* v. 63, Nov. 1957, p. 535-541.

14 ref. (L29; *Zn*)

148-L. (German.) **Preparation of Metal Surfaces for Lacquering.** H. Kohlhase. *Feingerate Technik,* v. 6, Aug. 1957, p. 371-375.

Main procedures for preparation under special consideration of electrolytic oxidation of Al alloys and phosphating of steel. (L14b, L19, L26n; Al, ST)

149-L.* (German.) **Vitreous Enameling of Cast Iron.** D. Kamran. *Giesserei,* v. 44, Nov. 21, 1957, p. 705-713.

Scale structure and oxidation rate of cast iron in different gases; comparison of surface roughness of shot-blasted coatings and shot-blasted plate; effect of added elements on castings to be enameled; effect of superheating the melt and repeated remelting; effect of moisture. Adhesion of enamel on spheroidal cast iron and on white cast iron. 23 ref. (L27; CI)

150-L. (German.) **Protection of Buoy-Boats by Metal Spraying.** Siegfried Hoffmann. *Schiffbautechnik,* v. 7, Sept. 1957, p. 511-516.

Zn and Al spraying has shown that higher costs are justified by longer and better protection. (L23, T22g; *Al, Zn*)

151-L. (German.) **Practical Application of Conversion Technique in Shipbuilding.** A. Habedank. *Schiffbautechnik,* v. 7, Sept. 1957, p. 516-520.

Phosphating gave good results for surfaces below water but is not reliable in other applications. (L14b, T22g)

152-L. (German.) **Use of Oxy-Acetylene Process for Hard Surfacing Parts Subjected to Wear, With Particular Reference to Lathe Tools.** Grix, Siebel and Fleck. *Schweissen und Schneiden,* v. 9, Nov. 1957, p. 473-483.

10 ref. (L24, W25n, 17-57)

153-L. (Japanese.) **Anodic Oxidation of Titanium. Pt. 2.** Kyuya Nagasaki and Haruo Ishida. *Light Metals* (Tokyo), v. 7, Sept. 1957, p. 70-72.

5 ref. (L19; Ti)

154-L. (Japanese.) **Wave Forms of Electric Current in Anodic Oxidation of Aluminum by Oxalic Acid Process.** Toyoji Ushioda, Osamu Yoshimura and Takashi Abe. *Light Metals* (Tokyo), v. 7, Nov. 1957, p. 64-67. (L19q; Al)

155-L.* **Protective Linings for Steel Shipping Containers.** Louis J. Nowacki. *Corrosion,* v. 14, Feb. 1958, p. 100t-102t.

Factors affecting lining performance include metal surface conditions, chemical and physical characteristics of lining, lining application and curing. Tests for linings and lined containers include product resistance, coating continuity, lining thickness, reverse-impact resistance, degree of cure. Types of lining materials available. (L26, W12c; ST)

156-L. Airless Spray Coating. *Machinery (London),* v. 91, Nov. 15, 1957, p. 1169-1170.

Spray painting. (L26)

157-L. Polishing Aluminium and Its Alloys. W. K. Bates and C. D. Coppard. *Metal Finishing Journal,* v. 4, Jan. 1958, p. 5-10, 26.

Chemical process, called Phosbrite 159, which is one of a range of chemical processes for polishing Al, Ni, Cu and Cu alloys (including basis and cartridge brass and gilding metals). (L12f; Al)

158-L.* **Anodic Oxidation of Aluminium Alloys Containing Copper.** J. Herenguel and P. Lelong. *Metal Finishing Journal,* v. 4, Jan. 1958, p. 20-23.

Speed of oxidation (or the current density) decreases markedly with increase of Cu content for the same voltage. Its importance has been measured with a high degree of precision on a series of Al-Cu alloys prepared from 99.99% purity Al containing from 0 to 4% Cu and perfectly homogenized by hot working. (L19, 2-60; Al, *Cu*)

159-L. (French.) **Plated Stainless Steel Sheet.** *Metallurgie et la Construction Mécanique,* v. 89, Nov. 1957, p. 935-937.

Advantages of plated stainless; choice of thicknesses, selection of base metal, amount of plating, as influenced by end use. (L17, 17-57; SS)

160-L.* (French.) **On the Anodic Oxidation of Aluminum Alloys Containing Copper.** Jean Herenguel and Pierre Lelong. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1197-1200.

Speed of oxidation, variations in thickness and yellow coloration in anodic film formed on homogeneous solid solution of high-purity Al-Cu analyzed as function of Cu concentration, current density, applied voltage, temperature, chemical composition of electrolyte. 4 ref. (L19; Al, *Cu*)

161-L. (German.) **Control of Optimal Condition for Electrolytic Polishing and Some New Developments in Baths.** I. Epelboin. *Metalloberflache,* v. 11, Nov. 1957, p. 346-349.

Some new methods for measuring the impedance modulus. This led to the determination of optimal bath concentrations. New types of baths of melted salts and melted metal hydroxides were developed. 17 ref. (L13p)

162-L. (German.) **Progress in Metal Spraying Techniques. Pt. 4.** H. Reiniger. *Metalloberflache,* v. 11, Nov. 1957, p. 361-365.

A survey of metal spraying techniques for protection against corrosion and scale, for sprayed bearings and other parts. Methods for repair and testing of sprayed surfaces. 91 ref. (L23, 10-54)

163-L. (German.) **Porosity of Nickel Plated Surfaces Caused by Oil.** K. Sommer. *Metalloberflache,* v. 11, Nov. 1957, p. 366-367.

5 ref. (L17, 9-68; *Ni*)

164-L. (German.) **Behavior of Some Base Materials During Electrolytic Plating. Pt. 1.** H. Hefele. *Metalloberflache,* v. 11, Nov. 1957, p. 368-370.

Defects on Ag plated brass sheets were traced back to the presence of beta-crystals and Pb precipitations in the alpha-structure. The critical range was found to be at 61 to 63.5% Cu and less than 0.1% Pb. (L17, 9-71; Ag, Cu, Zn, *Pb*)

165-L. (German.) **Automation in Surface Grinding and Polishing in Relation to Galvanizing Problems.** Otto Schleppi. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 370-376.

Semi-automation advantageous technically and economically. (L10b, L16, G18k, 18-74)

166-L. (German.) **Ball Burnishing; Some Principles of Barrel Operation.** M. Dreher. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 377-380.

Types of barrel construction; loading; form and size; operating time; speed of rotation. (L10b, W2s)

167-L. (German.) **Stainless Steel Polishing.** Klaus Heckrott. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 395-396.

Advantages of bonded polishing wheels emphasized. (L10b, W2p; SS)

168-L. (German.) **Economy in the Use of Oils for Metal Grinding and Polishing.** H. Windisch. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 396-399.

Proper fluid with proper application reduces working time, increases tool life, has advantageous cooling effect and results in better worked surfaces. (L10b, G18; NM-h)

169-L. (German.) **Mechanical Descaling of Wire Rod by Shot Blasting.** Erich Jaenichen, Alfred Duphorn, Hans Krautmacher and Wilhelm Püngel. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1785-1795.

4 ref. (L10c; ST, 4-61)

170-L. Surface Treating and Protectively Coating Aluminum Windows. R. J. Anen. *Industrial Finishing,* v. 34, Jan. 1958, p. 28-32.

Efficient, automatic cleaning, etching and laquering system on mass production scale. (L12, L26n, 18-74; Al)

171-L. Industrial Baking Enamels. Pt. 1. E. G. Shur. *Industrial Finishing,* v. 34, Jan. 1958, p. 52-58.

Historical review of synthetic resins as protective coatings. (L26p, A2)

172-L. Spray Metal Where it Counts. *Industry and Welding,* v. 31, Jan. 1958, p. 50-51, 66-67.

Examples of metallizing with stainless steel and spray welding with a powdered Ni-Cr-B mixture for protection against corrosion and wear. (L23; SS, B, Ni, Cr)

173-L. Vacuum Deposition Avoids Embrittlement. V. Dress. *Iron Age,* v. 180, Dec. 19, 1957, p. 142-145.

Cadium coatings on steel aircraft parts do not develop hydrogen embrittlement but meet all military specifications for adherence, corrosion resistance, coating thickness and uniformity. (L25g, Q26s; ST, *Cd*)

174-L. Blast Cleaners Treat Parts in Line. *Iron Age,* v. 180, Dec. 26, 1957, p. 52-53.

(L10c; 18-74)

175-L. New Coating Gives Magnesium Extra Protection. *Iron Age,* v. 181, Jan. 9, 1958, p. 64-66.

New air-drying thermosetting copolymer resin coating withstands thermal shock expected in missile applications. (L26p; Mg)

176-L. Lubricate Close Fits by Salt Bath Sulfurizing. G. B. Troup. *Iron Age,* v. 181, Jan. 9, 1958, p. 72-74.

(L15, 18-73; ST)

177-L. New Japanese Hard Chromium Plant. Yoshio Hirasawa. *Metal Finishing,* v. 56, Feb. 1958, p. 55-57.

The Aikoku Plating Industry Works, Ltd., Tokyo. (L17, *Cr*)

178-L. Barrel Chromium Plating—Continuous Bulk Processing. Henry Mahlstedt. *Metal Finishing,* v. 56, Feb. 1958, p. 58-60.

Operation of a newly developed continuous Cr plating barrel, recently installed at I.B.M. electric typewriter plant at Kingston, N. Y., makes it possible to obtain hourly plating output equal to that from 3½ to 4 batch barrels with greater economy and sharply reduced need for inspection. (L17, W3b; *Cr*)

179-L. Decoration of Tinplate by Roller Coater and Offset Tinprinting Machine. J. M. Boyle and J. Matthews. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 441-448, 462.

(L26f, L26n; Sn)

180-L. Application of Vitreous Enamel by the Electrostatic Process. S. Hallsworth. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 449-452, 464.

(L27)

181-L. Continuous Surface Pretreatment Processes With Particular Reference to "Nitec" Sheet for Vitreous Enamelling. W. H. F. Tickle and D. A. Winton. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 453-455.

(L27, L12, 5-53; ST)

182-L. Acid Copper Plating With Particular Reference to the Use of the Ubryco Process. M. R. Marshall. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 457-458, 462.

(L17; *Cu*)

183-L. Some Notes on Liquid Polishing Compositions. R. G. Hughes. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 459-461.

(L10b)

184-L. Experiences and Problems in the Surface Treatment of Die-Castings. Pt. 4. Electrolytic Processes. W. Rüegg. *Metal Industry,* v. 91, Nov. 29, 1957, p. 459-462.

14 ref. (L17, L19; *Cr, Ni,* Zn, 5-61)

185-L. Tough Tenacious Coating. *Modern Metals,* v. 13, Nov. 1957, p. 74-80.

Half-second butyrate has many advantages as clear colorless coating for Al. (L26p; Al)

186-L.* Antimony Plating on Steel and Zinc. G. R. Schaer, W. H. Safranek and C. L. Faust. *Plating,* v. 45, Feb. 1958, p. 139-143.

Antimony may be plated adherently and continuously on steel, if the steel is first conditioned by anodic treatment in acid solutions, or is electroplated with iron. Anodic acid activation of steel prior to plating improved the corrosion resistance of Sb-plated steel, but did not improve the corrosion resistance of Zn-plated steel. Sb-plated steel resisted corrosion better than Zn-plated steel in salt spray fog and in air saturated with water vapor. 14 ref. (L17, R3p; ST, *Zn, Sb*)

187-L. Vacuum Coatings Go Industrial. Philip J. Clough. *Product Engineering,* v. 28, Dec. 23, 1957, p. 67-69.

(L25g)

188-L. Epoxy Coatings: Performance and Application Data. Fred Grushoff. *Products Finishing,* v. 22, Jan. 1958, p. 42-47.

(L26p)

189-L. Brighter Prospects for Brass and Copper. Paul H. Margulies. *Products Finishing,* v. 22, Jan. 1958, p. 54-57.

Use of persulphate for cleaning brass and copper prior to painting or plating. (L12g; Cu)

190-L. Role of Oxygen in Iron-Enamel Adherence. *Products Finishing,* v. 22, Jan. 1958, p. 58-64.

Investigation at National Bureau of Standards on relationships between adherence of porcelain enamel

to iron and the oxygen content of the furnace atmosphere and the amount of cobalt oxide in the enamel. (L27, 2-66, 14-68; CI)

191-L. Pickling Stainless to Remove Scale. W. E. McFee. *Steel,* v. 141, Nov. 25, 1957, p. 103-107.

(L10c, L10d, L12g; SS, 9-52)

192-L. Wet Blast Finishing Goes Automatic. *Steel,* v. 141, Dec. 16, 1957, p. 106-107.

Automatic machine directs stream of liquid abrasive from blast gun to give metal parts clean ultra-smooth surface. (L10c, 18-74)

193-L. One Machine Anodizes Many Colors. *Steel,* v. 141, Dec. 30, 1957, p. 65-67.

(L19n, W3h; Al)

194-L. Progress of Bright Tin Plating. *Tin and Its Uses,* no. 41, Winter, p. 1-3.

(L17; *Sn*)

195-L.* Metal Spraying in Inert Atmospheres. R. E. Monroe, D. C. Martin and C. B. Voldrich. *Welding Journal,* v. 37, Feb. 1958, p. 114-119.

Zirconium coatings deposited on uranium by this method were porous and contained many spray particles which were not satisfactorily flattened out during deposition. A diffusion heat treatment after spraying was effective in eliminating the boundaries between individual Zr particles. As-sprayed and heat treated Zr coatings had good adhesion to U. (L23; U, *Zr*)

196-L. (Czech.) **Improving the Quality of Galvanizing.** Karel Janecky. *Korose A Ochrana Materialu,* v. 1, no. 5-6, 1957, p. 76-83.

11 ref. (L16; *Zn*)

197-L.* (French.) Thermal Oxidation of Cast Iron in Relation to Its Suitability for Powder Enameling. Roland Piva. *Fonderie,* no. 143, Dec. 1957, p. 533-544.

Four cast irons of varied compositions and surface characteristics were subjected to nine series of tests. Determinations were made of speed of hot oxidation as function of type of surface preparation (buffing, shot blasting, chemical cleaning); speed of attack by sulphuric acid; adherence of enamel as function of speeds of oxidation after chemical cleaning. For good adherence, iron surface should be free of magnetic oxide film and sufficiently rough to give optimum degree of oxidation. Influence of duration of chemical cleaning and of heating temperature. 4 ref. (L27, L12; CI)

198-L. (French.) **Girder Galvanizing Plant of Societe Metallurgique de l'Aisne.** *Metallurgie et la Construction Mécanique,* v. 89, Dec. 1957, p. 1033-1040.

Works layout, storage and mechanical preparation of girders; chemical preparation; heating plant; galvanizing. (L16, 18-67; *Zn*)

199-L. (Swedish.) **Electrochemical Surfacing.** Emanuel Warsztecki. *Teknisk Tidskrift,* v. 87, Sept. 3, 1957, p. 693-696.

Grinding and polishing by electrolytical processes. Reduction of diamond wear by electrolytic grinding. 3 ref. (L13p, G24d)

200-L. Glass Coatings Fight Corrosion. *Ceramic Age,* v. 71, Jan. 1958, p. 16-18.

(L29; NM-f42)

201-L. Copper Plating From the Pyrophosphate Bath. Pt. 1. S. K. Panikkar, R. P. Singh and T. L. Rama Char. *Electrochemical Society, Bulletin (India Section),* v. 6, Oct. 1957, p. 69-73.

12 ref. (L17a; *Cu*)

202-L. Equipment for Automatically Coating Washing Machine Tubs With Slip. J. H. Bauer. *Machinery,* v. 92, Jan. 10, 1958, p. 79-80.

(L27, 1-52, 18-74; NM-g34)

203-L. Damage by Uncontrolled Shot Blasting. Konrad Kornfeld. *Metal Progress,* v. 73, Feb. 1958, p. 92.

(L10c)

204-L. Painting Structural Steel. G. M. Hamilton. *South African Mechanical Engineer,* v. 7, Oct. 1957, p. 55-69.

(L26n; ST)

205-L. Mechanical Descaling and Drawing of Mild Steel Rods. L. Marsden. *Wire Production,* v. 6, Oct. 1957, p. 5-12.

(L10, F27; CN)

206-L. (German.) **Nonmetallic Inorganic Protective Films.** G. Elssner. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Aug. 1957, p. 324-327.

Processing and purpose of phosphate, chromate and oxide films on Fe, Zn, Al and Mg.

(L14a, L14b, L14c; Al, Fe, Zn, Mg)

207-L. (German.) **Indium Plating.** T. E. Brehmer and P. Alha. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Aug. 1957, p. 339-345.

13 ref. (L17; *In*)

208-L. (German.) **Phosphate Film on Metal Surface Improves Cold Work and Reduces Mechanical Friction.** H.

Keller. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Oct. 1957, p. 443-447.

(L14b)

209-L. (German.) **Filtration and Purification of Chromium Baths.** W. Machu. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Dec. 1957, p. 506-511.

(L17; *Cr*)

210-L. (German.) **Fully Automatic Plating of Brass and Bronze Armatures.** E. Lutter. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Dec. 1957, p. 512-515.

A working plan is suggested for high-luster Ni and Cr plating. A fully automatic machine reduces operational costs while increasing uniformity and quality of the coating. (L17, 1-52, W11q, 18-74; Ni, Cr, Cu-n, Cu-s)

211-L. (German.) **Metallic Coatings on Nonconductors (Plastics).** O. P. Krämer. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Dec. 1957, p. 516-520.

The metallization of plastics combines the advantages of both. Metallic coating protects plastics against mechanical and chemical influences. Five groups of preliminary treatment discussed. (L23; NM-d)

212-L. (German.) **Influences Upon the Structure of Electroplate.** P. Lenhard. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Dec. 1957, p. 528-535.

Influence of electrolyte, hydrogen, working conditions, colloids and other organic matter, after-treatment, heat, basic material, nonmetals, metallic foreign bodies, formation of alloys during electroplating. (L17, N12d)

213-L. Relationship Between Hydrogen Solubility and Reboiling Tendency in Enameling Steels. R. M. Hudson, J. K. Magor and G. L. Stragand. *American Ceramic Society, Journal,* v. 41, Jan. 1, 1958, p. 23-27.

9 ref. (L27, 9-71; ST, *H*)

214-L. Extrusion Cladding of NRU Fuel Elements. H. S. Milne. *Atomic Energy of Canada,* CRE-701, Apr. 1957, 35 p.

Vertical hydraulic press forces preheated Al billets into a converging chamber of a die-block arrangement. Metal flows around the core material and welds into a continuous sheath over the core as the core is guided horizontally through the die. (L22; Al, U)

215-L. Study of the Oxidation of Steel Plate as Related to Wettability and Adherence of Porcelain Enamel. Henry P. Still, Jr. *Ceramic Society Bulletin,* v. 37, Jan. 1958, p. 22-26.

Quick test to predict enamel behavior on steel plate without performing actual enameling operation. Adherence was correlated with oxidation. No relationship found between wettability and oxidation or adherence. 7 ref.
(L27, Q10c; 4-53, ST)

216-L. New Chemical Process Plates Resistant Nickel. *Chemical Engineering,* v. 65, Jan. 13, 1958, p. 172-174.

Niphos process chemically plates uniform Ni coat on complicated parts impossible to electroplate. Coat is hard, ductile and nonporous. (L28; *Ni*)

217-L. Nickel Protection for Ferrous Metals. *Design Engineering,* v. 4, Feb. 1958, p. 72.

The coating is heated in a reducing atmosphere to provide a tightly adhering Ni-alloy cladding that will not peel or flake. (L22; ST, *Ni*)

218-L. Effectiveness of Various Protective Coverings on Magnesium Fins at Mach Number 2.0 and Stagnation Temperatures up to 3600° R. William M. Bland, Jr. *National Advisory Committee for Aeronautics, Research Memo,* Jan. 9, 1958, 48 p.

(L22, 2-62; Mg, *Ni*)

219-L. Protection of Metals With Tannins. E. Knowles and T. White. *Oil and Colour Chemists' Association, Journal,* v. 41, Jan. 1958, p. 10-23.

Tannin extracts found of value in protecting ferrous metals from atmospheric and underground corrosion; use as wash-primers before painting. Solutions of tannin extracts lay down insoluble weather-resistant ferric tannate on ferrous metal surface. 11 ref.
(L26n, 4-60; ST, CI, NM-g35)

220-L.* (French.) **Special Application of Oxy-Acetylene Flame Descaling to the Preparation of Standard Rolled Products for Subsequent Spot Welding.** M. Evrard. *Revue de la Soudure,* v. 13, no. 4, 1957, p. 195-210.

Best operating conditions in terms of flame power, feeds and force of water jet, with an eye at all times to shop costs and quality of assemblies ultimately executed, were determined by measurement of contact resistances in descaled products. Special series of tests in which

descaling was done by other methods (sand blasting, shot blasting, grinding, chemical descaling) showed that best results in cleaning and subsequent spot welding are obtained by flame descaling. (L10g, K3)

221-L. Internal Burnishing. Lewis Bussey and Walter Vote. *Automatic Machining,* v. 19, Feb. 1958, p. 53-54.

Proper burnishing on multiple spindle automatic screw machine requires smooth reamed hole and secure spindle, slide and tool. Method may replace grinding operation. (L10b, W25, 1-52; ST)

222-L.* Leveling in Cyanide Copper Solutions — a Further Study. Barnet T. Ostrow and Fred Nobel. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 24-28.

With addition agents, modified cyanide copper bath levels and plates regardless of degree of roughness of base metal. The amount and kind of leveling and plating obtained compare favorably with that secured from present-day leveling Ni solutions plus ability to plate Zn die castings directly. 6 ref. (L17; ST, Cu, Zn, *Ni*)

223-L.* Bright and Semi-Bright Crack-Free Chromium. E. J. Seyb, A. A. Johnson and A. C. Tulumello. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 29-35.

Properties of the bright crack-free Cr deposit in comparison with the usual Cr deposits. Corrosion results with the regular salt spray, acetic acid salt spray, Corrodkote and outdoor exposure. 13 ref. (L17a, 8-72; *Cr*)

224-L.* Electroplating on Nickel and Nickel Alloys. W. W. Sellers and C. B. Sanborn. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 36-41.

Four basic steps are an electroplating bath, mechanical preparation, degreasing and cleaning, and activation of the basis metal. Various Ni plating baths which may be used—the Watts-low pH, Watts-high pH, chloride-sulphate, chloride, hard Ni, basic sulphamate, sulphamate plus Cl (-), and the fluoborate baths. Nominal composition, operating conditions, physical characteristics and mechanical properties of the Ni deposits. (L17; Ni)

225-L.* Influence of the Physical Metallurgy and Mechanical Processing of the Basis Metal on Electroplating. Pt. 4. The Effect of Different Ferrous Metals on the Performance of a Watts Nickel Deposit. AES Research Project No. 14. M. H. Jones, Chih-Yeu Lu and J. Zajdowski. *44th Annual Technical Proceedings—American Electroplaters' Society,* 1957, p. 53-69.

Test results on durability of Watts Ni deposit on various ferrous metals shows that there are significant differences between performance of certain metals with deposits of 0.0005 and 0.0001 in. These differences are considerably less at higher plate thicknesses. There is a basic corrosion rate which is determined by deposit thickness rather than the composition of basis metal. (L17c, 3-69; *Ni,* Fe, ST)

226-L.* Get Parts Cleaner by Ultrasonics. Norman G. Branson. *Materials in Design Engineering,* v. 47, Feb. 1958, p. 118-121.

Basically the technique consists of an ultrasonic generator, a transducer, a cleaning fluid and a tank. Widely varying frequencies, different types of transducers and various cleaning fluids. (L10f)

227-L. Textured Steel Metallized in Color. *Metalworking,* v. 14, Feb. 1958, p. 8-9.

Combination vacuum metallizing and enameling process creates a brilliant corrosion resistant finish in any color. Inexpensive finish will replace electroplating in many fields. (L23, L27, 1-73; ST, Al)

228-L. Rolling Improves the Finish, Hardens the Surface. *Metalworking,* v. 14, Feb. 1958, p. 10-11.

(L10b; CI)

229-L. Pack Chromizing Method Hikes Heat, Wear, Corrosion Resistance on Varied Components. Maurice C. Commanday. *Western Metalworking,* v. 16, Jan. 1958, p. 46-48.

Method allows application of inexpensive materials for use of gas stove radiants, gas turbine components, heat treat fixtures and piercing dies. Depth of Cr diffusion depends on carbon content of base metal. (L15, W28, 17-57; CI, ST, *Cr*)

230-L. Tumbling Methods Boost Output 3 to 5 Times; Cuts Manpower, Production Costs. Ron Wilke. *Western Metalworking,* v. 16, Jan. 1958, p. 52-54.

(L10d)

231-L.* (German.) Removability of Scale From Steel Sheet. Wilhelm

Rädeker and Max Wild. *Stahl und Eisen,* v. 78, Jan. 23, 1958, p. 100-103.

Scale removal from sheet (rolled from rimming steel killed by Si and Si and Al) by pickling, sand blasting, burning and natural weathering. Effects of final rolling temperature and method of casting. Comparison of results with structure and adhesiveness of scale. (L10c, L12g; ST, 4-53, 9-52)

232-L.* **Effects of Plating High Tensile Strength Steels.** Walter Beck and Edward J. Jankowsky. *American Electroplaters' Society 44th Annual Technical Proceedings,* 1957, p. 47-52.

C-ring test furnishes quick, semi-quantitative information concerning susceptibility of stressed high-strength steel tube specimens to cracking during and after electroplating. Stressed C-ring stimulates high-strength steel part with surface in state of high residual tensile stress, and will crack during Cd or Cr plating from cyanide or chromic acid bath. Time to cracking is extended considerably when prestressed rings are Cd plated from fluoborate instead of from cyanide bath. (L17c; ST, SGB-a, 9-72)

233-L. **Vapor Deposition of Molybdenum and Niobium Coatings on Stainless Steel Tubes.** Carroll F. Powell, Danny M. Rosenbaum, Robert B. Palmer and Ivor E. Campbell. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1228, Oct. 2, 1957, 8 p. (Available at U. S. Office of Technical Services, $.50.)

(L25k; *Cb, Mo,* SS)

234-L.* (German.) **Flame Spraying of Nonmetallic Protective Coatings on Metal Surfaces.** H. Reiniger. *Metalloberfläche,* v. 11, Dec. 1957, p. 393-400.

Preparatory treatment of adhesive base; various types of sprayers; materials suitable for spraying and influence of additions (polyisobutylene, stearates). Preparation of spray powders, properties and applications. (L26, W4g)

235-L. (German.) **Control of Anodizing by Voltage Regulation.** R. Lattey. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Jan. 1958, p. 11-13.

In all baths for anodic coating, measurement of voltage alone does not indicate thickness of layer to be expected. Thickness is determined primarily by the product of current density and time. (L19, S18)

236-L. (German.) **Pickling of Copper and Brass.** M. Straschill. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Jan. 1958, p. 20-23.

(L11g; Cu, Cu-n)

237-L. (German.) **Successful Application of Burnishing.** O. Melzer. *Werkstatt und Betrieb,* v. 91, Jan. 1958, p. 49.

(L10b)

238-L. **Plastic-Coated Steel.** *Automobile Engineer,* v. 48, Jan. 1958, p. 17-18.

(L26p; ST)

239-L. **Corrosion Prevention at the Stern Areas of H. M. Ships.** J. C. Kingcome. *Corrosion Prevention and Control,* v. 4, Dec. 1957, p. 35-40.

Reinforced epoxy resin coatings for propeller shafts and neoprene for rudders and stern brackets have proved generally satisfactory. (L26p, R4b, T22)

240-L. **Electroplating of Screws and Other Small Parts. Pt. 2.** Werner Peters. *Draht (English Edition),* no. 32, Dec. 1957, p. 31-42.

Modern electroplating equipment and high-efficiency electrolytes. (To be continued.) (L17, 1-52, T7f)

241-L. **Compressed Air and Its Application in Metal Finishing.** James Robertson. *Electroplating and Metal Finishing,* v. 11, Jan. 1958, p. 3-8, 14.

Metal spraying. 5 ref. (L23)

242-L.* **Selection and Use of Phosphate Coatings as Pretreatments for Organic Finishes.** R. F. Drysdale. *Electroplating and Metal Finishing,* v. 11, Jan. 1958, p. 9-14.

Characteristics of phosphate coatings including crystal size, free pore area, thickness, weight, corrosive residues, resistance to deformation; function of the coating in preventing corrosion and promoting adhesion of the organic finish. (To be concluded.) (L14b, L26)

243-L.* **Some Aspects of Cleaning Prior to Metal Finishing.** Bruce Whitehead. *Electroplating and Metal Finishing,* v. 11, Feb. 1958, p. 35-42.

Types of soil, degree of cleanliness required, cleaning methods, including the use of blasting, barrelling, acid solvents, alkaline cleaners, emulsion cleaners, chlorinated hydrocarbons and fused salt baths; methods of agitation in cleaning, equipment and materials for ultrasonic cleaning. 6 ref. (L10, L12)

244-L. **Survey of Abrasion-Resistance Tests for Vitreous Enamels.** J. A. Clarke. *Foundry Trade Journal,* v. 104, Feb. 13, 1958, p. 179-183.

Attempts to establish a standard scratch-resistance test for vitreous enamels. No pratcical method of doing so has yet been found.
(L27, Q9n)

245-L. Flow Coating Setup for Painting Structural Steel. E. A. Moenning. *Industrial Finishing,* v. 34, Feb. 1958, p. 26-30.
(L26n; ST)

246-L. New Finishing Setup for Steel Office Furniture. *Industrial Finishing,* v. 34, Feb. 1958, p. 54-56.
(L-general; ST)

247-L. Non-Yellowing Lacquer Protects Outside Aluminum Products. *Industrial Finishing,* v. 34, Feb. 1958, p. 58-60.
(L26n, Al)

248-L. Painting Steel Pails. H. L. Cerniak. *Industrial Finishing,* v. 34, Feb. 1958, p. 62-64.
(L26n; ST)

249-L. Painting Rough Metal and Castings. Karl F. Schreiber. *Industrial Finishing,* v. 34, Feb. 1958, p. 94-98.
Crinkle finishes and hammer-effect enamels for coating rough metals; preventing blisters in baked enamel applied over Al and Mg castings.
(L26n; Al, Mg, Zn, 5-60, 8-71)

250-L. Epoxide Resins in Anti-Corrosion Finishes. Frank L. Farr. *Industrial Finishing (London),* v. 9, Dec. 1957, p. 986-991.
(L26p)

251-L.* Porous Chroming. R. Josse and N. Manson. *Industrial Finishing (London),* v. 9, Dec. 1957, p. 1004-1006.
Historical development, methods of pretreatment, suitable metals and techniques of producing porous Cr in cylinders of airplane and other engines. (To be concluded.)
(L17; *Cr*)

252-L.* Radiometric Study of the Iron Phosphating Process. S. L. Eisler and Jodie Doss. *Industrial Finishing (London),* v. 9, Dec. 1957, p. 1008-1012.
SAE 1020 steel test coupons phosphated by spraying with or immersion in phosphate solutions. Radioactive phosphorus-32 employed to determine percentage of iron phosphate in coatings produced with different methods and solutions.
(L14b, 1-59; CN)

253-L. Silicone Based Paints for Industrial Finishing. *Industrial Finishing (London),* v. 10, Feb. 1958, p. 26-29.
(L26p)

254-L. High Temperature Coatings. Alfred F. Hofstatter. *Industrial Finishing (London),* v. 10. Feb. 1958, p. 34-36.
(L-general; SGA-h)

255-L. Processing and Finishing Zinc-Coated Sheet. *Industrial Finishing (London),* v. 10, Feb. 1958, p. 41.
(L17, 4-53; ST, *Zn*)

256-L. Vacuum Deposition Avoids Embrittlement. V. Dress. *Iron Age,* v. 180, Dec. 19, 1957, p. 142-145.
Cadmium coatings on steel aircraft parts do not develop hydrogen embrittlement but meet all military specifications for adherence, corrosion resistance, coating thickness and uniformity.
(L25g, Q26s; ST, *Cd*)

257-L.* Glass Coatings. A Good Way to Protect Metals. Charles E. Bullock and Forest Nelson. *Materials in Design Engineering,* v. 47, Mar. 1958, p. 106-109.
Chemical and physical properties, performance capabilities and design factors in the use of new glass coatings. (L27; NM-f42)

258-L.* Spray Cleaning, Pickling and Phosphating. A. J. Steiger. *Metal Finishing,* v. 56, Mar. 1958, p. 48-51.
Spray-jet methods, combining mechanical and chemical action, are used for cleaning, pickling and rustproofing metal parts in Russian auto, tractor and farm machinery factories. Advantages include higher productivity, shorter treatment time and improved quality.
(L12, L14b)

259-L.* Chemical Polishing. Lester F. Spencer. *Metal Finishing,* v. 56, Mar. 1958, p. 52-56.
Probable mechanism of chemical polishing; relationship between it and bright dipping. In the Battelle process, a phosphoric-nitric-acetic acid mixture is used for polishing alpha brass and high-nickel alloys. Some disadvantages of this method can be overcome by substituting hydrochloric for nitric acid and using certain other additives. Mechanical polishing is frequently used to condition surfaces prior to chemical polishing. (L12)

260-L.* Hot Grit Blasting Improves Phosphate Coatings. Jacob Knanishu. *Metal Finishing,* v. 56, Mar. 1958, p. 57-62.
Panels of 1020 cold rolled steel were tested, using a salt spray, for corrosion resistance by grit blasting and phosphate coating. Blast-

ing improved corrosion resistance only slightly. When similar panels were also painted with a styrenated phthalic alkyl enamel, grit-blasted panels showed markedly improved resistance. (L10c, L14b; CN)

261-L. Electropolishing Copper, Brass and Aluminum. K. F. Lorking. *Metal Finishing,* v. 56, Mar. 1958, p. 64, 68.

(L13; Cu, Al, Cu-n)

262-L. Flexibility and Labor Reduction Feature New Plating Department. Donald A. Sigman. *Metal Finishing,* v. 56, Mar. 1958, p. 65-68.

Semi-automatic nickel-plating installation featuring a common cleaning cycle, any selected plating combination and a common drying cycle. Plating and cleaning times may be varied independently. (L17; Ni)

263-L. Finishing Pointers. Strike Cleaning. J. B. Mohler. *Metal Finishing,* v. 56, Mar. 1958, p. 69.

(L12k, L13n, L17)

264-L.* Descaling of Titanium. W. B. Stephenson, Jr. *Metal Progress,* v. 73, Mar. 1958, p. 87-89.

A hot solution of sulphuric acid and calcium fluoride, followed by nitric-hydrofluoric acid, gives a bright surface, free from pits. Such treatment does not endanger formability. (L12g, Q23q, Q5; Ti)

265-L.* Which Coating at High Temperature? Gordon D. Oxx, Jr. *Product Engineering,* v. 29, Jan. 20, 1958, p. 61-63.

For use above 1000° F., protective coatings should control oxidation of the base metal, prevent erosion and be compatible with the base metal. Good resistance to oxidation is found in the noble metals and the ceramics, which are brittle under high stress or impact loading. Protective scale formation is promoted by about 20% Cr in the stainless steels, cobalt-base superalloys and nichrome, or Al or Cr-Al. Chart of typical coating compositions; Ni and Ni-base alloys on Mo, Cr on 18-8 stainless, alumina on alloys of iron, Ni, Mo, Co. (L-general, R1h; SGA-h)

266-L.* Porcelain Coatings on Steel. L. E. Fussell and H. P. Tripp. *Product Engineering,* v. 29, Feb. 17, 1958, p. 75-77.

Advantages of enameling cold rolled steel and firing at 1200 to 1400° F. Compares coating properties with enamels fired at conventional temperatures. Cause and correction of coating defects. (L27; ST)

267-L.* Bright Nickel Plating. Pt. 1. Basic Solutions. D. J. Fishlock. *Product Finishing,* v. 11, Jan. 1958, p. 48-62.

Origins and evolution of bright Ni solution; modified Watts-type solutions; effect of variety of addition agents on brightness. 35 ref. (L17a; Ni)

268-L. Influence of Mica on Impact Resistance Stoving Finishes. H. W. Chatfield. *Product Finishing,* v. 11, Jan. 1958, p. 70-73.

Use of ground mica for improving adhesion or for adsorbing or distributing internal stresses in a coating. (L26p, Q6n)

269-L. Production Buffing With Liquid Compositions. Pt. 2. H. L. Kellner. *Product Finishing,* v. 11, Jan. 1958, p. 74-77.

Factors controlling metal removal by buffing where liquid compound is sprayed on buffing wheel. (L10a)

270-L. Fabricating Continuous Galvanized Steel. Pt. 2. Tips on Using a Product With Wide Applications. Ernest W. Horvick. *Steel Processing and Conversion,* v. 44, Feb. 1958, p. 92-94, 103, 104.

(L16, Q23q; ST)

271-L. (French.) Phosphation With Iron Phosphate. M. J. Demesse. *Corrosion et Anti-Corosion,* v. 6, Feb. 1958, p. 37-39.

(L14b)

272-L.* (French.) Some New Ideas on the Protection of Magnesium-Base Alloys. W. F. Higgins. *Corrosion et Anti-Corrosion,* v. 6, Feb. 1958, p. 40-43.

Anodic treatment in acid ammonium fluoride insures cleanness and passivation of alloy surface; prefinishing with special resin, Araldite 985E, provides undercoating of high impermeability, adherence and flexibility as base for protective paint. Chemical passivation following anodic treatment is recommended for parts destined for severe service conditions, and is obligatory in Great Britain for aeronautical components in magnesium-base alloys. (L19, R10c; Mg)

273-L. (French.) Chemical Treatments for Aluminum and Alloys as a Protection Against Oxidation or as a Preparatory Step Before Painting. Claude Hess. *Corrosion et Anti-Corrosion,* v. 6, Feb. 1958, p. 44-47.

4 ref. (L14b, L14c, L19; Al)

274-L.* (French.) **Industrialization of Chemical Nickel Plating.** R. Bailleul. *Corrosion et Anti-Corrosion,* v. 6, Feb. 1958, p. 48-50.

Principle of chemical nickel plating; technology; properties of deposits; applications of process. (L28; Ni)

275-L.* (French.) **Variations in Density of Phosphate Coatings on Iron and in Their Protective Value as a Function of Duration of Coating Process.** Emilio Jimeno and Antonio Arevalo. *Corrosion et Anti-Corrosion,* v. 6, Feb. 1958, p. 51-58.

Study showed that thickness of coatings is not a simple function of duration of treatment. Phenomena of partial redissolution and regrouping occur in phosphated layer concomitant with changes in grain size, and these changes affect protective power of coating. 10 ref. (L14b; Fe)

276-L. (French.) **Painting of Hot Galvanized Steel.** J. F. H. Van Eijnsbergen. *Peintures, Pigments, Vernis,* v. 34, Jan. 1958, p. 5-9.

15 ref. (L26n, 2-62; ST, Zn, 8-65)

277-L. (German.) **Protecting Steel Screws From Corrosion.** G. Becker. *Draht,* v. 9, Jan. 1958, p. 13-15.

Chromium diffusion coatings produced by "Inkrom" method. (L15, T7f; ST, *Cr*)

278-L.* (German.) **Sand Blast Cleaning.** H. Koeller. *Giesserei-Praxis,* no. 2, Jan. 25, 1958, p. 28-34.

Short review of different techniques and systems. Methods of dust removal; cleaning agents. (L10c, A8a; NM-f45)

279-L. (German.) **Containers and Tubes With Lead Protective Coatings.** M. Reinert. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 6-11.

Technology of electrolytic lead coating and of sheet-lead linings. 3 ref. (L17, L22, W12c; 4-60; *Pb*)

280-L. (German.) **Fire Sprayed Metal Coatings as Corrosion Protection.** T. Hoffmann. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 12-14.

Zinc, aluminum and lead flame sprayed coatings for protection of steel. 9 ref. (L23; ST, *Al, Pb, Zn*)

281-L. (German.) **Rubberizing of Tubes and Containers.** H. Germar. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 15-18.

(L26r, W12c, 4-60)

282-L. (German.) **Plastic Coatings for Tubes and Containers.** L. Benker. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 18-22.

(L26p, W12c, 4-60)

283-L. (German.) **Flame Sprayed and Sintered Plastic Coatings.** E. Gemmer. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 22-25.

(L26p, 4-60)

284-L. (German.) **Protection of Tubes and Containers With Lacquer.** K. H. Hauck. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 26-28.

Practical factors to be considered in lacquering for storage. (L26n, W12c, 4-60)

285-L. (German.) **Protection of Tubes and Containers With Plastic Dispersions.** H. Groebler. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 28-34.

Method of dispersion coating with high and low-pressure polyethylene, "Teflon" and "Hostaflon". (L26p, W12c, 4-60)

286-L. (German.) **Enamel Coating of Tubes and Containers.** A. Schwab. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 35-37.

Adhesion to steel, quality control, application, testing and behavior on heat shock. 12 ref. (L27, W12c, 4-60; ST)

287-L.* (Spanish.) **Accelerators in Cold Phosphating.** Lamberto A. Rubio Felipe. *Instituto del Hierro y del Acero,* v. 10, Oct-Dec. 1957, p. 441-453.

Study of cold phosphate coating of a mild commercial steel and an electric steel, both of low carbon content. Influence of nature of material treated, phosphate concentration in bath and pH. Effect of organic and inorganic accelerators on thickness of coating and grain size of deposits. (L14b, 1-67; CN-g)

288-L. Improved Coatings for the Protection of Water-Sealed Gas Holders. *Corrosion Prevention and Control,* v. 5, Feb. 1958, p. 44-46.

Protective system provided a primer based on Zn and "Epikote" resin to give solvent resistance and anticorrosive properties, with the top coat of a catalyzed pure "Epikote" resin-based enamel to consolidate the solvent and chemical resistance. (L27)

289-L. Flame Spraying of Metals. D. E. J. Cunningham. *Corrosion Technology,* v. 5, Mar. 1958, p. 71-74.

Technique whereby a metallizing pistol passes metal in the form of powder or wire through the center of an oxy-fuel gas flame, where it is melted, picked up by a stream of air at high velocity and propelled

on to a suitably prepared surface to form a coating. (L23, R-general)

290-L. Low Cost Hard-Facing by Spraying. J. R. Franklin. *Corrosion Technology,* v. 5, Mar. 1958, p. 75-76.

(L23)

291-L. 'Serseal' — Development in Fume Prevention. R. E. Shaw. *Corrosion Technology,* v. 5, Mar. 1958, p. 79-80.

Sealing layer technique applied to Granodine phosphate treatment minimizes steam evolution and condensation and lowers gas consumption. (L14b, A8a)

292-L.* Bright Anodizing by the Modified Erftwerk Process. R. Peek and A. W. Brace. *Electroplating and Metal Finishing,* v. 11, Mar. 1958, p. 71-76.

A modification of the Erftwerk process for the chemical brightening of commercially pure Al extends the optimum brightness range. Effects of inhibitors, lead content and operating temperatures. 7 ref. (L19; Al-a)

293-L. A.R.D.E. Chemical Smoothing Process for Steel. Some Recent Applications. *Electroplating and Metal Finishing,* v. 11, Mar. 1958, p. 82-83.

3 ref. (L12g, G24b; ST)

294-L.* Amino Acid Cadmium Plating Solutions for Ultra High Strength Steel. P. N. Vlannes, S. W. Strauss and B. F. Brown. *Electroplating and Metal Finishing,* v. 11, Mar. 1958, p. 85-87.

Various amino acid complexing agents added to cadmium plating solutions resulted in better deposition and reduction of hydrogen embrittlement. (L17a; ST, *Cd*)

295-L. Porous Chroming. Pt. 2. *Industrial Finishing (London),* v. 10, Jan. 1958, p. 47-50.

Deposition of Cr on engine cylinder walls and development of porosity. Control of adherence, hardness and porosity. (L17; *Cr,* 9-68)

296-L. Metal Treatment of Aircraft. *Industrial Finishing (London),* v. 10, Mar. 1958, p. 30-33.

I. C. I. Alocrom pretreatment process at Vickers Aircraft. (L12h, T24a, Al)

297-L.* Painting Hot Dip Galvanized Steel. J. F. H. van Eijnsbergen. *Industrial Finishing (London),* v. 10, Mar. 1958, p. 34-36.

Paints containing around 80% Zn dust and 20% vehicle have long been known for their excellent performance, for example, as coatings for water tanks. The Zn-rich paints for Zn dust compounds give a dry film containing 94-95% Zn dust and only 5-6% of a vehicle which is generally a synthetic resin. (L26n; ST, *Zn,* 8-65)

298-L. Metal Finishing in the Mining Industry. *Industrial Finishing (London),* v. 10, Mar. 1958, p. 37-39

(L26p, R-general, T28r)

299-L. Mechanized Roll Coating. Thomas A. Dickinson. *Industrial Finishing (London),* v. 10, Mar. 1958, p. 43-44.

Two electrically rotated coating rolls—horizontally aligned, one over the other—with automatic-feed units make it possible to coat either one or two surfaces of a flat material in a single pass. (L26, 4-53)

300-L.* Pickling, Descaling, and Derusting of Steels. W. Bullough. *Metallurgical Reviews,* v. 2, no. 8, 1957, p. 391-405.

Pickling theory, pickling of mild steel, electrolytic pickling, gas pickling, sodium hydride pickling, disposal of spent pickle liquor, other methods of descaling. 51 ref. (L12; ST)

301-L. Slide-Honing—a New Barrelling Technique. Charles Emerson. *Metalworking Production,* v. 102, Mar. 14, 1958, p. 453-455.

A precision technique which confines parts to sliding and rolling actions that remove stock accurately, without damage. (L10d)

302-L. Organic Finishes Over Metal Surfaces. Myron Perez. *Plating,* v. 45, Mar. 1958, p. 239-244.

Present and potential uses of epoxies, phenolics, acrylics and vinyl dispersion coatings. (L26p)

303-L. Fabricating Continuous Galvanized Steel. Tips on Using a Product With Wide Applications. Ernest W. Horvick. *Steel Processing and Conversion,* v. 44, Jan. 1958, p. 43-46.

Three basic methods of galvanizing are hot dip or "batch" galvanizing, continuous hot dip galvanizing, electro-galvanizing; specifications. (To be continued.) (L16; ST, *Zn*)

304-L. Electrophoretic Deposition of Plutonium. A. Feasibility Study. K. A. Walsh. *U. S. Atomic Energy Commission,* LA-2153, Jan. 1958, 13 p.

(L29p; Pu)

305-L.* Accelerators and Their Function in Phosphating Solutions. Lloyd O. Gilbert. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 73-78.

Acceleration by saturating solution with metals in form of ferrous and Mn salts and with heavy metals in form of Cu and Ni salts. Another method is electrolytic polarization. Compares reactions of nitrate and nitrate-nitrite, depolarizers and metal oxiders, solutions in bath and resulting coatings. 13 ref. (L14b)

306-L.* Latest Development in Electroplating With Ultrasonics. Stanley R. Rich. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 87-90.

Ultrasonics improve and accelerate the plating process. Applications are chiefly in Ni, Zn, Cr and Ag plating. Technique applied to Watts bath, fluoborate bath and a variety of proprietary bright Ni solutions. (L17, 1-74)

307-L.* Barrel Plating. Paul Glab. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 116-120.

Comparison of oblique and horizontal types of barrel plating. Pickling and cleaning, alkaline descaling by immersion and electrolytic process and activating of the metal. Recommended solutions, concentrations and operating conditions for Cd, Zn, Cu, brass, Ni and Fe plating. (L17, W3b, 1-52)

308-L.* Further Studies on Nickel-Iron Alloy Electrodeposits. I. W. Wolf. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 121-123.

Effects of 79% Ni, 21% Fe alloy plating parameters and thickness and use of alloy as a bright protective coating. Grain size and magnetic properties of very thin films. Current density, pH, and grain size as a parameter are poor. Plating was tested with salt spray. Pits and amount of oxide excreted from each pit were less for Ni-Fe coating compared with Ni coating from Watts bath. (L17; *Ni, Fe*)

309-L.* Iridium Plating and Its High Temperature Oxidation Resistance. James C. Withers and Paul E. Ritt. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 124-129.

Use in missiles and aircraft. Iridium plates could protect stainless steel from flaking and scaling and Mo from forming volatile oxide at high temperatures. Most successful conditions were developed using sodium cyanide and potassium cyanide in molten state. Iridium plating (0.0005 in. thick) keeps stainless steel from scaling when exposed for 30 min. at 1000° C. Thicker plates would offer complete protection of Mo at high temperatures. 3 ref. (L17, T24; SS, Mo, *Ir*)

310-L.* Surface Catalyzed Reduction of Copper. A. E. Cahill. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 130-131.

Deposition of thick Cu films by chemical reduction proved unsuccessful with hypophosphite but practical with formaldehyde. Three alkaline Cu tartrate-formaldehyde solutions were found to deposit Cu autocatalytically to produce thick films. Experiments suggest that Cu reduction takes place by the transfer of electrons through the metal film from species existing in the alkaline formaldehyde solution to Cu at another point on the metal surface. There is not always a 1:1 ratio between H_2 and Cu deposited. 4 ref. (L17; *Cu*)

311-L.* Sealing of Sulfuric Acid Anodic Films on Aluminum. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 132-142.

Methods included water sealing at various pH values and sealing times, steam sealing at atmospheric and 15 psi. in dichromate, molybdate, nickel acetate and silicone solutions. Molybdate seals with colorless coating and may be useful method. Extent of sealing was rated by weight gain on sealing, weight loss on immersion in cold sulphuric acid solution, cathodic current flow and resistance to acidified salt spray and outdoor exposure. 38 ref. (L19; Al)

312-L.* Role of Chromate Treatments in the Finishing of Aluminum. Walter E. Pocock. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 152-155.

Chromate treatment can often be substituted for anodizing. It requires no electrical current, short time for processing, no venting for tank, and operates at room temperature. Coating can be applied by immersion, brush or spray; dimensional change is negligible; control of bath is relatively simple. 5 ref. (L14c; Al)

313-L.* (English.) Study of the Anode Area in Electrolytic Polishing of Copper. Masao Naruse and Akira Nannichi. *Tohoku University, Technology Reports,* v. 22 no. 1, 1957, p. 29-39.

Consideration should be given to positional arrangement of the cathode, uniform distribution of current, cathode surface area. Bubbling during electropolishing, electrolyte convection and potential distribution in the cell should influence pole distance. If cathode area is too small, surface finish on the anode is unsatisfactory. With unchanged cell voltage, if the anode area decreases, the current density increases, and decreases as anode area and pole distance become greater. (L13p; Cu)

314-L.* (French.) **Recent Developments in Anodic Oxidation.** F. Flusin. *Alluminio,* v. 27, Jan. 1958, p. 13-18.

Review of developments in France in anodic treatment in bulk of small objects. Impregnation of porous castings with bakelite resin prior to anodic treatment reduces number of rejects. Bloom appearing on anodized surface of architectural Al exposed to industrial atmospheres. (L19; Al)

315-L. (German.) **Sand Blast Cleaning of Castings.** H. Koeller. *Giesserei-Praxis,* v. 75, Nov. 25, 1957, p. 489-495.

Proper selection of type and size of blast cleaning equipment depends on the work to be cleaned. Use of metal abrasives versus natural sand advised in most cases. Various models shown. (L10c; 5-60)

316-L. (German.) **Plating and Automation in Volkswagen Plant.** R. O. Becker. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Feb. 1958, p. 45-52.

To be continued. (L17, T21, 18-74)

317-L.* (German.) **Experimentation With Chemical and Electrochemical Removal of Chromium Plating From Copper.** W. Schlittgen. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Feb. 1958, p. 53-57.

Worn Cr plating from Cu printing plates was removed chemically in dilute hydrochloric acid at 50-60° C. Removal time decreases with increasing solution temperature. Test for electrolytic removing was performed in sodium hydroxide solution (8%) with and without bagging. Best results were obtained at a current density of 10-15 amp. per sq. dm. Solution attack on Cu base increases with increasing current density. (L12g, L13n; *Cu, Cr,* 8-62)

318-L.* (German.) **Electropolishing.** Siegfried Gruttner. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Feb. 1958, p. 58-62.

Process applicable to Fe, steel, Cu, Ni and Zn. Chromic acid bath used in pretreatment, followed by degreasing and rinsing. Bath compositions and current densities for polishing various metals. (L13p; CI, ST, Cu, Ni, Zn)

319-L. (German.) **Synthetic Rubber Products for Protection Against Corrosion.** St. Reiner. *Werkstoffe und Korrosion,* v. 9, Jan. 1958, p. 1-4.

7 ref. (L26r)

320-L.* **Slide Takes the Curse Out of Tumbling.** *American Machinist,* v. 102, no. 4, Feb. 24, 1958, p. 97-99.

Improved barrel confines parts to sliding and rolling actions that remove stock accurately, without damage. Various sizes of barrels are mounted at various angles on rotating face plate. Importance of proper angle and size of barrel, choice of abrasive compound and chips, experience of operator in controlling variables which gives desired finish. (L10d, 1-52)

321-L.* **Aluminum Coated Steel.** W. E. McFee. *Iron Age,* v. 181, no. 6, Feb. 6, 1958, p. 95-97.

Sheet steel coated on both sides with Al possesses surface characteristics of Al and physical and mechanical properties of steel. Materials resist atmospheric corrosion to serve a wide variety of outdoor products. Standard fabrication procedures for cold rolled steel must be modified. (L22, R3; ST, *Al,* 17-57)

322-L.* **High-Frequency Vibrations Slash Barrel Finishing Time.** *Iron Age,* v. 181, Feb. 20, 1958, p. 86-87.

New machine with standard barrel vibrates and rotates to give superior finish with ease and speed. This machine cuts finishing time to less than one-half the usual time, more than doubles the normal workpiece loads and successfully tumbles the "impossible" pieces. (L10d, 1-52)

323-L.* **How to Grind and Polish Stainless Steel.** *Metalworking,* v. 14, no. 3, Mar. 1958, p. 18-21.

Important advantages of stainless steel are lost if the finish is wrong. Equipment and procedures used to get any one of several different surface finishes. Special polishing techniques are used with stainless steel because finishes wanted by users often differ widely. (L10b, G18; SS)

324-L. **Vacuum Metallizing With Aluminum.** *Light Metal Age,* v. 16,

Feb. 1958, p. 32, 34.
(L23, 1-73; *Al*)

325-L. Deburring With Ultrasound. *Steel,* v. 142, Apr. 7, 1958, p. 102-103.
(L10f)

326-L. (French.) Recent Improvements in Phosphating Techniques. Roger Lagarde. *Corrosion et Anticorrosion,* v. 6, Mar. 1958, p. 107-108.
(L14b)

327-L. (Book.) 44th Annual Technical Proceedings, American Electroplaters' Society, 1957. American Electroplaters' Society, 445 Broad St., Newark 2, N. J.

Papers abstracted separately. (L17)

328-L. Pointing Out Pluses of Fine-Grain Plating. *Chemical Week,* v. 82, Mar. 22, 1958, p. 29, 32.

Fine grain is achieved by depositing the Ni from a standard nickel sulphate bath, containing no organic additives, onto a mandrel coated with about 15% (by weight) resinous binder (e.g., plasticized vinyl) and 85% conductive material (e.g., graphite, powdered metal) having extremely small particle size. (L17, *Ni*)

329-L. Electroplating of Screws and Other Small Parts. Pt. 3. Werner Peters. *Draht (English Edition),* no. 33, Feb. 1958, p. 19-24.

Factors determining the increase of the deposited layer which therefore affect the calculation of the thickness of the deposit; effective surface area of the material, current, plating period, current distribution, distribution of the deposit and other losses. (L17)

330-L. Auxiliary Equipment for Plant Finishing. Allen S. Dawe and John A. Kinn. *Industrial Heating,* v. 25, Mar. 1958, p. 559-566.
(L26, 1-52)

331-L. Firing Vitreous Enamels on Aluminum in a Conveyorized Oven. L. T. Ives. *Industrial Heating,* v. 25, Apr. 1958, p. 771-778.
(L27, W4k; Al)

332-L.* Improved Method for Hard Surfacing of Aluminum. John Starr. *Light Metal Age,* v. 16, Feb. 1958, p. 35-36.

Method for producing thick aluminum oxide coatings utilizes acid electrolyte, low temperatures, and electrical current; properties of coating. (L17, Al)

333-L. Quantity Production of Motor Car Bumpers. C. Starzman. *Machinery (London),* v. 92, Feb. 21, 1957, p. 421-425.
(L-general, T21c)

334-L. Some Thoughts on the Treatment of Surfaces by Anodic Oxidation. J. M. Kape. *Metal Finishing Journal,* v. 4, Feb. 1958, p. 39-43.
(L19; Al)

335-L. Rational Approach to Surface Treatment of Sheet Iron and Steel Articles. *Metal Finishing Journal,* v. 4, Feb. 1958, p. 53-60.
(L-general, A5; ST, Fe, 4-53)

336-L. Depositing Silver Coatings on Glass, Ceramic, Wood, Ivory, and Similar Materials. Elias Schore. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 80-82.
(L-general, T9; *Ag,* NM)

337-L. Rational Approach to Paintshop Layout for Painting Parts of Varying Type. B. van der Bruggen. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 83-88.
(L26, 18-67)

338-L. Rhodium Plating of Commutator Segments. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 89, 93.
(L17, T1; *Rh*)

339-L. Electrolytic Descaling of Titanium Alloys. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 95-96.
(L13; Ti)

340-L. Some Notes on American Experience in Plating With Ultrasound. Harry A. Reich. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 97-98.
(L14, L17; 1-74)

341-L.* Vapor Plating of Nickel. L. W. Owen. *Metal Industry,* v. 21, Mar. 1958, p. 227-230.

Nickel coating from nickel carbonyl vapor. Design of equipment. (L25, 1-52; *Ni*)

342-L. Chelating Agents: Their Value and Applications in Metal Finishing. D. J. Fishlock. *Metal Industry,* v. 92, Apr. 4, 1958, p. 271-273.
(L17a)

343-L.* Stress-Free Nickel Plating. *Metal Progress,* v. 73, Apr. 1958, p. 90-92.

Nickel in stress-free condition or with compressive stress can be plated from a sulphamate bath. It is finding a number of engineering applications on parts plated to improve fatigue life and minimize fretting and wear, and in electroforming to avoid distortion. It holds promise for improved high-

temperature coatings for missiles and rockets. (L17a, Q25; *Ni*)

344-L.* Which Finish for Zinc Die Castings. Ray Stricklen. *Product Engineering,* v. 29, Mar. 3, 1958, p. 59-61.

Chart for ten finishing processes, mechanical, chemical, plating and painting methods, with the number of preparation steps needed for a given finish. Basic data for each type of finish: purpose, appearance, resistance to weathering, wear, humidity, salt spray; preparation required; application methods; relative cost; government specifications available; and special properties. (L-general; Zn, 5-61)

345-L.* Textured Steel. Ford R. Park. *Product Engineering,* v. 29, Mar. 17, 1958, p. 73-78.

Synthetic and porcelain enamels, lacquers, plated metals, oxidized coatings, plastic laminates and effects like wood grain, leather and cloth give texture to steel surfaces and fittings. Textured steel is produced by rolling sheet or strip stock between forged steel rolls, one or both of which carry the pattern. (L29; ST, 4-53)

346-L. Pre-Treating and Painting the Vickers Vanguard. *Product Finishing,* v. 11, Feb. 1958, p. 60-67.

Surface flaws and cracks in metal parts detected by dye penetration method. Cleaning and painting processes for subassembly parts of skin, wing plates and details. (L12, L26, S13k)

347-L. Electroplating Explained. A Course for the Practical Plater. Pt. 1. Inorganic Chemistry. H. Hartley. *Product Finishing,* v. 11, Feb. 1958, p. 68-73.

(To be continued.) (L17; NM-a)

348-L.* Bright Nickel Plating. Pt. 2. Process Details. D. J. Fishlock. *Product Finishing,* v. 11, Feb. 1958, p. 80-94.

Current British practice in Ni plating; pretreatment, etching solutions, plant equipment, Ni anodes. 27 ref. (L17; *Ni*)

349-L. Post-War Development of the Tinplate Industry in Western Europe. Pt. 3. Belgium and the Netherlands. W. E. Hoare. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 181-187.

(L13, L16, L17; *Sn*)

350-L. Application of Precoated Steel Sheets in Industry. E. Marks *Sheet Metal Industries,* v. 35, Mar. 1958, p. 195-201.

Production and uses of tinned, terne, lead and phosphate-coated sheets, blue-planished sheets, aluminized sheets and plastic-coated sheets. 11 ref. (L16, L14a, L14c; ST, 4-53)

351-L. Conductor Wire Plated Continuously. *Steel,* v. 142, Mar. 24, 1958, p. 118, 121.

Copper coating on steel core for telephone drop wire. (L17, T1b; ST, *Cu*)

352-L. (German.) **Corrosion Protection of High-Frequency Measuring Apparatus.** Werner Junge. *Feinwerk Technik,* v. 61, Dec. 1957, p. 427-430.

(L-general, X10)

353-L.* (German.) **Hard Chromium Plating and the Tool Industry.** Karl Schopper. *Industrieblatt,* v. 58, Feb. 1958, p. 40-44.

Advantages of Cr plated tools are less friction, higher stability, lower fluctuation of cutting strength, resistance to corrosion. Principal disadvantage is brittleness. Suitable steel for tools and various types of plating; examples; sharpening and heat treatment. (L17; TS, *Cr*)

354-L. (German.) **Automatic Washing and Etching Units for Up to Date Surface Treatment.** Heinz Anders. *Industrieblatt,* v. 58, Feb. 1958, p. 53-55.

Modern equipment for degreasing, etching, passivating, phosphating. Suitable chemical agents; handling equipment; dipping and spraying methods; combined degreasing-etching methods. (L12, 1-52)

355-L.* (German.) **Pickling of Brass Strips in Dilute Sulphuric Acid.** M. Stammler and F. Neumuller. *Metall,* v. 11, Nov. 1957, p. 945-947.

Pickling of brass with oxidized surface is performed through a reaction between the metal oxide and the acid. During the second reaction through an electrochemical process the dissolved Cu is precipitated and Zn dissolves. (L12g; Cu-n, 4-53)

356-L. (German.) **Protection Against Corrosion by Electroplating.** J. Elze. *Metall,* v. 12, Jan. 1958, p. 32-38.

Kind of material to be coated, surface finish, desired appearance, service conditions and cost determine choice of coating. Electrochemical reaction between base material and coating, information on right thickness and typical characteristics of various coatings. (L17)

357-L. (German.) **Anodizing and Its Application in Metal Structures.** M. Gottschalk. *Metall,* v. 12, Mar. 1958, p. 209-214.

Purpose and characteristics of anodic oxidation; selection of materials; technique of preparation, treatment and post-treatment. Control and care of finished parts; cost calculation; applications. (L19)

358-L. (German.) **Chemical and Electrolytic Polishing.** J. Heyes. *Technische Mitteilungen,* v. 50, Jan. 1957, p. 25-27.

8 ref. (L12, L13p)

359-L. (Russian.) **Effect of Electromechanical Scraping on Surface Layer of Iron.** B. M. Askinazi and B. G. Alekseev. *Vestnik Mashinostroeniya,* Feb. 1958, p. 59-61.

(L10h, S15; Fe)

360-L. Vapour-Blasting of Tools. *Aircraft Production,* v. 20, Feb. 1958, p. 61-63.

Tests in machining turbine blades with and without vapor-blasted tools to determine effect of process on lengthening tool life. (L10c, T6n)

361-L. Special Machine Anodizes Chevrolet Grille and Headlamp Bezel. *Automotive Industries,* v. 118, Feb. 1, 1958, p. 58-59, 115.

(L19, 1-52, T21c; Al-b)

362-L. Special Purpose Shot Blasting Installations. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 55-58.

Four installations designed for mechanical cleaning of steel strip or large and unusual castings. (L10c; 4-53, 5-60, ST)

363-L.* Protective Coatings Based on Bitumen. John Stanford. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 62-64.

Origin and use. Colored coatings formulated with synthetic resins, solvents and pigments. Aluminum metal flakes yield a good coating. (L26a; *Al*)

364-L. Precision Barrel Finishing of Aluminum Alloy Castings. E. A. Reynolds. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 24-25.

(L10d; Al-b, 5-60)

365-L. Electro-Deposition of Zinc: Russian Experiments on Effect of Divalent Manganese. W. G. Cass and Yu. B. Kletenik. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 32. (From *Zhurnal Prikladnoi Khimii,* v. 8, 1957, p. 1250-1252.)

(L17a, P15m; *Zn, Mn*)

366-L. Bright Tin Plating May Oust Mechanical Polishing. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 35-36.

(L17a; *Sn*)

367-L. Ceramic Coatings Prevent Corrosion. *Industrial Finishing (London),* v. 10, Apr. 1958, p. 40-42, 44, 46.

Research and development techniques in the use of ceramic coatings to protect metals from high-temperature atmospheric corrosion. (L27, R3n; NM-g34)

368-L. Is Automatic Hardfacing for You? Spencer Payne. *Welding Engineer,* v. 43, May 1958, p. 32-33.

Cost factors and limitations involved in hard facing of metal components subjected to heavy wear. (L24)

369-L. Spray and Fuse, a Popular Hardfacing Method. H. S. Gonser. *Welding Engineer,* v. 43, May 1958, p. 34-36.

Parts are grit blasted and coated with hard facing powder. The powder is then fused to form a molecular bond between coating and base metal. Method of determining maximum thickness of coating, details of preparation of parts. (L24)

370-L.* Filler Metals for Joining. Orville T. Barnett. *Welding Engineer,* v. 43, May 1958, p. 40-45.

Specifications, description, applications for 45 types of filler metals used in hard facing. (L24; SGA-f)

371-L (French.) **Causes, Remedies and Prevention of Silver Plating Defects.** Andre Saglier. *Galvano,* v. 27, Mar. 1958, p. 27-31.

(To be continued.) (L17, 9-70; *Ag*)

372-L. (French.) **Some General Remarks on Galvanizing.** A. Herz. *Metallurgie et la Construction Mecanique,* v. 90, Feb. 1958, p. 107-110.

(L16; *Zn*)

373-L.* (French.) **Ultrasonic Cleaning of Metal Parts and Optical Lenses.** Marcel Boyer. *Trempe,* no. 34, Jan. 1958, p. 28-33.

Equipment and application. 13 ref. (L10f)

374-L.* (German.) **Testing of Paint Coats.** D. Wapler. *Metalloberfläche,* v. 12, Apr. 1958, p. 113-119.

Modern state of paint coat testing. Relationship between working conditions and test conditions; methods of determining coat thickness; testing physical and mechanical properties of coats, testing stability. (L26n, 1-54; NM-g30)

375-L. (German.) **Concentration Changes in Electroplating Baths.** A. V. Krusenstjern and H. Schlegel. *Metalloberfläche,* v. 12, Apr. 1958, p. 119-122.

Experimental electrolysis for the purpose of examination of mechanism; importance of diffusion polarization. (L17a)

376-L.* (German.) **Effect of Welding Conditions on Compostion and Structure of Deposited Hard Chromium Alloys.** Helmut Koch and Elmar Bernholz. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 71-76.

Composition and structure of filler alloys; essentials for transformation hardness by martensite formation in basic structure; effect of welding conditions on hardness and wear resistance; use of double electrodes; phase diagrams. (L24, Q29; Q9n; *Cr*)

377-L. (German.) **Surface Treatment of Blooms and Intermediate Products by Means of Mechanical Flaming. Pt. 1.** H. E. Habbig and A. Pfeuffer. *Schweissen und Schneiden,* v. 10, Mar. 1958, p. 94-98.

Development of process and its mechanism; manual and mechanical flame treatment; types of machines; gas consumption. (L10g, 4-52)

378-L.* (Italian.) **Bright Chromium Plating of Light Alloys.** F. Sacchi. *Galvanotecnica,* v. 9, Jan. 1958, p. 1-16.

Prefinishing operations, including pickling, etching, undercoating with Zn, Cu, brass, Ni; final Cr plating; techniques and processes in Europe and U. S. A.; influence of pickling solutions, etchants, undercoatings on corrosion resistance and adherence of Cr deposits. 26 ref. (L17, L12g; Al, Mg, *Cr*)

379-L.* (Italian.) **Filling Blowholes in Castings by the Metallizing Process.** Gian Giacomo Caccia. *Rivista di Meccanica,* v. 9, Jan. 18, 1958, p. 55-58.

Metal spraying is more economical than other methods for salvaging large or complicated defective castings since only defective areas are treated. Preparatory steps and spraying techniques for repair of iron, carbon steel, stainless, brass, bronze and copper castings. (L23, E26)

380-L. (Russian.) **Facing With Hard Metals.** M. A. Tylkin and M. I. Kershtein. *Metallurg,* Jan. 1958, p. 5-6.

Fusing stalinite, sormite and metallic electrodes on working surfaces by electric arc considerably extends length of service of knives, spades and other implements. (L24)

381-L. (Russian.) **Reagent for Electrolytic Cleaning of Chromium-Nickel Austenitic Alloys.** Yu. B. Malevskii. *Zavodskaya Laboratoriya,* Jan. 1958, p. 111-112.

(L13n; SS)

382-L. Industrial Baking Enamels. Pt. 3. E. G. Shur. *Industrial Finishing,* v. 26, Mar. 1958, p. 26, 28, 30, 32, 34, 36, 40.

Comparative evaluation of the relative merits of paint versus porcelain; or organic versus inorganic coating over steel. (L26n; L27; ST)

383-L. Vacuum Metallizing: Metal and Plastic Products. Chas. Matilo, Jr. *Industrial Finishing,* v. 26, Mar. 1958, p. 62-64.

(L23, 1-73)

384-L. Twin Finishing System for Flo-Coating and Spraying of "Utility" Appliances. *Industrial Heating,* v. 25, Feb. 1958, p. 335-342.

Conveyorized completely automatic finishing system. (L26n, 18-74)

385-L. Ceramic Coating of Magnesium. Paul A. Huppert. *Light Metal Age,* v. 16, Apr. 1958, p. 8-10.

(L27; Mg)

386-L. Examples of Fixtures Employed for Barrel-Finishing. *Machinery (London),* v. 92, Apr. 11, 1958, p. 841-842.

(L10d, W2s)

387-L. Automatic Plating for Automobile Components. *Metal Industry,* v. 92, Apr. 18, 1958, p. 313-316.

(L-general, T21c; 18-67, 18-74)

388-L. Metal Laminates Come of Age. Arvin Develops Processes for Drawing, Spot Welding and Plating Vinyl-Metal Laminates. *Modern Industrial Press,* v. 20, Apr. 1958, p. 19-20.

(L26p, K11d, 7-58)

389-L. Cleaning and Preparation of Metals Prior to Electroplating. Effect of Oxide Films. Pt. 10. Experimental Results. Henry B. Linford and David O. Feder. *Plating,* v. 45, Apr. 1958, p. 349-359.

Oxides were applied to degreased and hydrogen reduced Cu surfaces. Ni was plated from a high-pH Watts bath without allowing contact with air. 15 ref. (L12, L17; *Ni,* Cu)

390-L. Electroplating Research at the International Nickel Co. Research Laboratories. *Plating,* v. 45, Apr. 1958, p. 360-365.

(L17, A9h)

391-L. Bright Nickel Plating. Pt. 4. Deposit Characteristics. D. J.

Fishlock. *Product Finishing,* v. 11, Apr. 1958, p. 79-90.
17 ref. (L17a; *Ni*)

392-L. Electroplating Explained. A Course for the Working Plater. Pt. 3. Measuring Instruments. H. Hartley. *Product Finishing,* v. 11, Apr. 1958, p. 96-102.
(L17, X7a, X9n, X3n)

393-L. Plating Helps Titanium. *Steel,* v. 142, May 5, 1958, p. 102-104
Chromium plating overcomes galling and seizing tendencies. Cu and Ni are used as undercoatings. Missile makers use electrical and electroless methods.
(L17a, L28; Ti, *Cr, Cu, Ni*)

394-L.* Techniques for Coating Metals With Molybdenum. Seymour Senderoff. Paper from "The Metal Molybdenum", American Society for Metals, p. 199-213.
Of the three methods for producing Mo coatings, metal spraying, vapor deposition, and electro-deposition, only the first has had any commercial applications and these have been limited. Vapor-deposited coatings, by both the carbonyl and Mo pentachloride processes and electrodeposited coatings have been studied only in the laboratory. 20 ref. (L17, L23, L25; *Mo*)

395-L.* Protection of Molybdenum Against High-Temperature Oxidation. Julius J. Harwood. Paper from "The Metal Molybdenum", American Society for Metals, p. 420-461.
Most successful coating compositions that have been developed thus far center around the Ni-Cr alloy system. Both electroplated Cr-Ni layers and sprayed Ni-Cr alloys containing S and B have demonstrated a capacity to protect Mo up to about 2000° F. Sprayed mixed silicide layers also appear promising. 23 ref. (L17, L23; Mo)

396-L. New Method of Increasing the Wear Resistance of Tracks With Open Bushings. A. A. Maurakh. *Vestnik Mashinostroeniya,* v. 36, no. 12, 1956, p. 16-18. (Henry Brutcher Translation no. 3962, Altadena, Calif.)
Merits of boronizing to give maximum wear resistance to carbon structural steel. (L15, Q9a; ST, *B*)

397-L. Heat-Resisting Hard Iron-Chromium-Nickel Facings. G. Faber. *Schweizer Archiv,* v. 23, no. 1, 1957, p. 14-19. (Henry Brutcher Translation no. 4072, Altadena, Calif.)
Previously abstracted from original. See item 224-L, 1958.
(L16; Cr, Ni, Fe, SGA-m, 2-62)

398-L. (Czech.) Deposition of Chromium From Polychromate Baths. Vladimir Klapka. *Korose a Ochrana Materialu,* v. 1, no. 7-8, 1957, p. 101-107.
Chromium cannot be deposited from bichromate baths even if catalytic agents are used, but deposition is possible from the baths of other polychromates. Effect of the order of the polychromate and of the free chromic acid and sulphuric acid on the cathode efficiency. Effects of temperature, concentration of chromic acid and impurities (Cr_2O_3 and Fe_2O_3) on appearance of coatings from tetrachromate baths. (L17a; *Cr*)

399-L. (Czech.) Tin Plating of Cast Iron. Karl Janecky. *Korose a Ochrana Materialu,* v. 1, no. 7-8, 1957, p. 109-112.
The difficulties in the process and methods that facilitate the process. Explanation of formation of the tin coating on basis of the binary Fe-Sn diagram. Properties of the coating. (L17; CI, *Sn*)

400-L. (Dutch.) Protective Coatings for Very High Temperatures. F. Loos. *Lastekniek,* v. 24, Mar. 1958, p. 34-38.
"Rokide" flame spray method for applying a protective pure oxide coating of very high melting point. (L27; NM-a34)

401-L. (French.) Petroleum Bitumen for Protection of Underground Pipelines. H. Goldstein. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 315-322.
9 ref. (L26a; 4-60)

402-L. (French.) Thermal and Anticorrosion Insulation: A New Insulating Material Combining Both Properties. J. F. Williams and E. A. Blackwell. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 323-326.
Gilsonite coatings for pipes carrying hot gases. (L26, 2-62; 4-60)

403-L. (French.) Galvanizing Cast Iron. A. Hiscock. *Fonderie Belge,* v. 28, Mar. 1958, p. 79-87.
Advantages of cast iron with high silicon (3-4%) and phosphorus (1%). (L16; *Zn,* Cl, *P, Si*)

404-L. (French.) Matte Formation in Galvanizing Baths. A. Herz. *Metallurgie et Construction Mecanique,* v. 90, Mar. 1958, p. 197-199.
(L16; *Zn*)

405-L. (German.) Application of Centrifugal Shot Descaling Plants in Bar Drawing Plants. Fritz Kottmeier. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 358-364.
7 ref. (L10c, F27; ST, 4-55)

406-L. (Italian.) Paints as Anticorrosive Agents. Giampaolo Bolognesi.

Rivista di Meccanica, v. 9, Jan. 18, 1958, p. 43-48.
(L26n, R-general)

407-L.* (Book—German.) **Costing in Electroplating.** Bernhard Gaida, Eugen G. Leuze Verlag, Saulgau, Wurttemberg. 1958, 104 p. DM 6.40.

Detailed discussion of material costs, current costs, salaries, overhead costs, value of refuse, profits and taxes. Examples include calculation for copper, nickel, chromium and silver plating. 13 ref.
(L17, A4s; *Cu, Ni, Cr, Ag*)

408-L. Automatic Control of Electroplating. H. Silman and K. M. G. Stewart. *Automation Progress,* v. 3, Feb. 1958, p. 44-47, 49.
(L17, 18-74)

409-L. New Phosphate Process Development Reduces Fixed Operating Costs. D. A. Paull. *Automotive Industries,* v. 118, Mar. 1, 1958, p. 23, 64.
(L14b)

410-L. What's New in Refractory Ceramic Coatings for Super Metal Alloys. *Ceramic Industry,* v. 70, Mar. 1958, p. 62-64.

Available materials, their handling, testing and application to meet needs of super and hypersonic speeds. Evaluates properties in terms of their chemical resistance at high temperatures, heat reflectivity, abrasion and friction resistance at high temperatures. (L27, P11, Q9n, R-general, 2-62; SGA-h)

411-L. Electrolytic Polishing of Stainless Steel. P. F. McKinney. *Chemical and Process Engineering,* v. 39, Feb. 1958, p. 59-60.

New type of surface finish which gives increased corrosion resistance, cleanliness and greater freedom at design stage. (L13p; SS)

412-L. Dip Painting and Flow Coating. *Electroplating and Metal Finishing,* v. 11, Apr. 1958, p. 105-109.
(L26n)

413-L. Dipping and Stove Enamelling Facilities at M. E. Beswick Ltd. *Electroplating and Metal Finishing,* v. 11, Apr. 1958, p. 121-122.
(L26, L27)

414-L. New Metal Finishing Installations at Vauxhall Motors Ltd. Pt. 1. The Canning Automatic Plating and Polishing Machines. *Electroplating and Metal Finishing,* v. 11, Apr. 1958, p. 125-134.
(L-general, L17, W3; Cu, Cr)

415-L. How to Flat Polish Stainless Steel. Thomas C. Smith. *Grinding and Finishing,* Apr. 1958, p. 34-36.
(L10b; SS)

416-L.* The Production of Multicolor Effects on Anodized Aluminum. V. F. Henley. *Institute of Metal Finishing, Bulletin,* v. 8, Spring 1958, p. 91-100.

Commercial processes for producing multicolor patterns and designs in anodic coatings. Method giving random patterns and accurate reproduction of design by processes where form of resists is mechanically applied to produce a pattern or where light sensitive compounds are used. 22 ref. (L19; Al)

417-L. Hard-Facing of Oil Tools. J. S. Goodwin. *International Acetylene Association, Official Proceedings,* 1956, p. 33-37.
(L24, T28; 6-69)

418-L. Science for the Coatings Technologist. Pt. 9. Metallic Pigments. E. S. Beck. *Metal Finishing,* v. 56, Apr. 1958, p. 52-55, 57.

Aluminum, leafing and nonleafing aluminums, metallics, hammered finishes. (L26n, 17-57; Al, NM-g30)

419-L. Finishing Pointers. Chromium Plating Thickness. J. B. Mohler. *Metal Finishing,* v. 56, Apr. 1958, p. 58, 67.

Decorative, engineering, cutting and die applications. (L17; *Cr*)

420-L.* Cold Chromium Plating in Russia. A. J. Steiger. *Metal Finishing,* v. 56, Apr. 1958, p. 56-57.

Russian machine tool specialists have been employing an electrolyte for cold plating which requires 1/3 to 1/4 of the current density of the conventional electrolyte and has better throwing power. Best composition is said to be 250 g. per l. of chromic acid and 4 g. per l. of ammonium fluoride. Plating is done at 15 to 25° C. and current density of 8 to 12 amp. per sq. dm. (L17, 1-67; *Cr*)

421-L. New Vinyl Paint Facilities at Poughkeepsie IBM. Henry D. Bowen, Jr. *Metal Finishing,* v. 56, Apr. 1958, p. 59-61.
(L26p)

422-L.* Chemical Polishing. Pt. 2. Lester F. Spencer. *Metal Finishing,* v. 56, Apr. 1958, p. 62-67.

Three major processes are phosphoric-nitric, phosphoric-nitric-acetic and phosphoric-sulphuric-nitric acid mixtures. Main industrial application for chemical polished Al is as a pretreatment for decorative anodizing. Two types of finish may be

obtained; a highly polished mirror type obtained by the slower acting solutions; a bright finish with usually lower specular reflectivity than that exhibited in mechanically polished surfaces. 39 ref. (L12g)

423-L. Science for Electroplaters. Pt. 35. Ion Exchange Properties. L. Serota. *Metal Finishing,* v. 56, Apr. 1958, p. 68-70.

(L17)

424-L. New Refrigerator Painting Line Features Flow-Coat Priming and Electrostatic Finishing at the Dundee Works of Astral Equipment Ltd. *Metal Finishing Journal (London),* v. 4, Apr. 1958, p. 127-129, 131.

(L26n, T10a)

425-L. Micrograin Nickel Is Flexible, Yet Hard. *Metalworking Production,* v. 102, Apr. 25, 1958, p. 735-736.

(L18, M27c, Q23p; Ni)

426-L. Finishing Die Castings. Pt. 3. Barrel Finishing. Robert E. Earl. *Precision Metal Molding,* v. 16, Apr. 1958, p. 51-53, 58.

Barrel techniques for producing any of the five accepted classes of surface finishes on die castings. (L10d; 5-61)

427-L.* Finishing Die Castings. Pt. 4. Cleaning. A. T. Thibadeau. *Precision Metal Molding,* v. 16, May 1958, p. 51-52, 54, 64.

Mechanical and chemical cleaning methods for die castings prior to painting or plating. Solvents, alkaline solutions and acid detergent solutions used for specialized purposes. Ultrasonics and electrocleaning are effective. Formulations for electrocleaning of Zn, Cu, Pb, Al and Mg alloys. (L10, L12, L13; 5-61, Zn, Cu, Pb, Al, Mg)

428-L. Flame-Sprayed Ceramic Coatings. Thomas A. Dickinson. *Production,* v. 41, Mar. 1958, p. 84.

Use of powder-type metallizing gun to deposit refractory particles onto Al, Ti and other surfaces through an open gas flame conveys very little heat to materials with low melting temperatures because heat-softened powder particles cool rapidly after they are fused on deposition surface. (L27, W4g; Al, Ti, SS)

429-L. Bright Nickel Plating. D. J. Fishlock. Pt. 3. Solution Control. *Product Finishing,* v. 11, Mar. 1958, p. 87-101.

21 ref. (L17a; *Ni*)

430-L. The Production and Properties of Prepainted Steel Strip. *Sheet Metal Industries,* v. 35, May 1958, p. 395-399, 412a.

(L26n; ST, 4-53)

431-L. High Temperature Protective Coatings for Magnesium. C. R. Fitzgibbon, E. H. Miller and M. A. Glaser. Midland Industrial Finishes Co. (Wright Air Development Center). *U. S. Office of Technical Services,* PB 131073, Apr. 1957, 112 p. $3.

Calcium chromate pigmented primer containing 35% pigment and an aluminized topcoat. (L26n; Mg-b)

432-L. The Effect of Corrosion Preventives on Chromic Acid Films Adsorbed on Phosphate Coatings. W. D. McHenry and J. Doss. Rock Island Arsenal Laboratory. *U. S. Office of Technical Services,* PB 131296, 15 p. $.50.

(L14b, R10b)

433-L. Investigation of the Applicability of High Frequency Sound Waves (Ultrasonics) for Cleaning of Precision Parts. O. E. Mattiat and P. P. Zapponi. Clevite Research Center. (Wright Air Development Center). *U. S. Office of Technical Services,* PB 131361, June 1957, 76 p. $2.

(L10f)

434-L. Boronizing of Working Surfaces of Low Alloy Steel. V. D. Taran and L. L. Skugorov. *Vestnik Mashinostroeniya,* v. 37, no. 5, 1957, p. 62-65. (Henry Brutcher, Altadena, Calif., Translation no. 4084.)

(L15; AY, *B*)

435-L. (English.) Variations of Concentration in the Layers of the Chrome Plating Bath Near the Electrodes, and Mechanism of the Electrodeposition of Chromium. A. I. Levin and A. I. Falicheva. *Journal of Applied Chemistry of the USSR,* v. 29, no. 11, (1957), p. 1801-1809. (Translation by Consultants Bureau, Inc.)

10 ref. (L17a; *Cr*)

436-L. (English.) Study of Anode Area in Electrolytic Polishing of Copper. Masao Naruse and Akira Nannichi. *Tohoku University, Technology Reports,* v. 22, no. 1, 1957, p. 29-39.

(L13p; Cu)

437-L. (French.) Causes, Remedies and Prevention of Silver-Plating Defects. André Saglier. *Galvano,* v. 27, Apr. 1958, p. 27-30.

(Concluded.) (L17; *Ag,* 9)

438-L. (French.) Present and Future Progress of Metal Finishing. T. P.

Hoar. *Galvano,* v. 27, Apr. 1958, p. 31-35.

(L-general)

439-L. (French.) **Electrolytic Polishing of Germanium and Silicon. I.** Epelboin and M. Froment. *Métaux Corrosion-Industries,* v. 33, Jan. 1958, p. 1-5.

4 ref. (L13p; Ge, Si)

440-L. (French.) **Microscopic Observation of Metallic Surfaces During the Course of Electrolytic Treatment. I.** Epelboin, M. Froment and G. Nomarski. *Revue de Metallurgie,* v. 55, Mar. 1958, p. 260-264.

(L13, M27)

441-L. (German.) **Enamelled Aluminum.** H. Kyri. *Aluminium,* v. 34, Apr. 1958, p. 213-216.

(L27; Al-b)

442-L. (German.) **Plating and Automation in Volkswagen Plant. Pt. 3.** Rolf O. Becker. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Mar. 1958, p. 93-101.

(Concluded.) (L17, T21c, 18-74)

443-L. (Italian.) **Anti-Corrosive Paints.** Carlo Rossi. *Vernici,* v. 14, Jan. 1958, p. 51-67.

Types of anti-rust paints, composition, vehicles, pigments, behavior in service. (L26n)

444-L. (Russian.) **Nickel Plating Process Without Application of Electric Current.** N. A. Solov'ev. *Vestnik Mashinostroeniya,* Mar. 1958, p. 82-84.

Nickel plating by chemical methods dispenses with need for electrical equipment; gives more even Ni coating on complex parts; increases antifriction qualities because of 7-9% phosphorus content. 13 ref. (L28; *Ni*)

445-L. (Spanish.) **Metal Protection; Dip Coating With Aluminum.** Manuel Serra. *Revista de Ciencia Aplicada,* v. 12, Jan-Feb. 1958, p. 31-42.

Characteristics and properties of Al coating; literature review; technical and scientific advances in various countries; summaries of Uyeno, Acco, zinc chloride, Nillson, Aldip, Mollerizing and Battelle Kacc processes. 58 ref. (L16, 10-54; *Al*)

446-L.* **Anodic Corrosion of Metals and Alloys in Pyrophosphate Solutions.** T. L. Rama Char. *Corrosion Prevention and Control,* v. 5, Apr. 1958, p. 37-38.

Anode efficiencies of close to 100% were obtained in Sn, Cu, Zn, Ni and Pb pyrophosphate plating solutions. Alloys of the metals were also studied. Effectiveness of solutions is increased by the use of additives. 7 ref. (L17a)

447-L. **Surface Preparation for Protective Linings and Coatings Used in Critical Service.** S. J. Oechsle Jr., and K. G. LeFevre. *Engineers' Digest,* v. 18, Nov. 1957, p. 485-514.

(L10, L13)

448-L. **Non-Metallic Plating of Aluminum.** John Starr. *Pacific Factory,* v. 88, Nov. 1957, p. 24-25.

Ceramic coatings of great wear resistance now produced electrochemically. (L27; Al-b)

449-L. **New High-Speed Hot-Tinning System for Fine-Gauge Copper Wire.** O. Haugwitz. *Draht, English Edition,* no. 34, Apr. 1958, p. 24-26.

New hot tinning system gives speeds of up to 5904 ft. per min. while providing a large output in a relatively small space with a notable lowering of operating costs. (L16, 4-61, Cu, *Sn*)

450-L. **Electroplating of Screws and Other Small Parts. Pt. 4.** Werner Peters. *Draht, English Edition,* no. 34, Apr. 1958, p. 28-32.

Quality control, removal of defective deposits, treatment of effluent in mass-production electroplating; costing methods in electroplating expressed in terms of plating period, plating system and ampere-hr. used. (L17, T7f)

451-L.* (French.) **Surface Treatments.** J. Bigeon. *Industrie Chimique,* v. 45, Feb. 1958, p. 34-40.

Cleaning prior to pickling; solvents, procedures, recovery of heavy solvents; hygiene and safety in cleaning departments; corrosion by solvents; stabilization of chlorinated solvents. (To be continued.) (L12h)

452-L.* (German.) **Precipitation of Bright Metal Deposits.** Karl Müller. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Apr. 1958, p. 131-134.

Theoretical considerations on mechanism of metal precipitation as electrocrystallization. Conditions of bright deposition. Geometrically directed dissolution (anodic polishing) and precipitation (bright deposition). (L17, L19, L13)

453-L.* (Italian.) **Problems in Surface Treatment of Aluminum.** F. Sacchi. *Alluminio,* v. 27, Feb. 1957, p. 63-71.

Special attention to structure of anodic films and sealing process; polishing, pickling, finishing of cast-

ings, architectural coloring and vitreous enameling. 26 ref.
(L-general; Al)

454-L.* (Italian.) **Nickel Plating and Bright Chromium Plating of Light Alloys.** *Alluminio,* v. 27, Feb. 1958, p. 93-98.

Step-by-step description of process based on preliminary galvanizing; other types of processes and their applications; recommended thicknesses of deposits according to use; methods of determining adherence, thickness and corrosion resistance of coatings. 12 ref.
(L17; EG-a39, *Ni, Cr*)

455-L. (Italian.) **High Polish Silver Plating. Pt. 2.** *Galvano Tecnica,* v. 9, Apr. 1958, p. 91-99.

Literature review. 25 ref.
(L17; *Ag*)

456-L. Metallizing. A Reclamation Tool. *Diesel Power,* v. 35, Nov. 1957, p. 48-50.

(L23)

457-L. New Plating Method Keeps Ultra-Strength Steel Ductile. William F. Hamilton and Myron Levine. *Metalworking,* v. 14, June 1958, p. 8.

(L17, SS)

458-L.* Finishing Die Castings. Pt. 2. Polishing and Buffing. P. R. Kalischer. *Precision Metal Molding,* v. 16, Mar. 1958, p. 59-60, 62-64.

Tabular presentation indicating optimum abrasives, grit, belt speeds, lubricants and contact wheels.
(L10a, L10b; Al, Mg, Zn, 5-61)

459-L. A New Horizon in Barrel Finishing. *Precision Metal Molding,* v. 16, Mar. 1958, p. 65.

Addition of vibration to normal rotation so that the vibration action places abrasive media where bridging would ordinarily occur, or into guarded areas that would be normally missed. (L10d)

460-L. Developments in Decorative Plating. C. H. Sample. *Society of Automotive Engineers,* v. 22C, Jan. 1958, 14 p.

General discussion of Cr and Ni plating. 12 ref. (L17; *Ni, Cr*)

461-L. Quality of Decorative Plating. D. M. Bigge. *Society of Automotive Engineers,* v. 22A, Jan. 1958, 9 p.

Consideration of service performance of plated parts of automobiles, design of parts and unreliability of accelerated tests now in use.
(L17c, R11)

462-L. Mechanical Descaling, Particularly Bend Descaling, in Wire Production. Clemens Eisenhuth. *Stahl und Eisen,* v. 77, Mar. 21, 1957, p. 324-334. (Iron and Steel Institute Translation no 544.)

Previously abstracted from original. See item 213-L, 1957.
(L10g; ST, 4-61)

463-L. Coating of Metals With Synthetic Materials. G. Schulz. *Schwizer Archiv,* June 1956, p. 178-182. (Iron and Steel Institute Translation no. 678.)

Previously abstracted from original. See item 607-L, 1956. (L26)

464-L. (French.) **Clad Steel.** *Metallurgie et la Construction Mecanique,* v. 90, May 1958, p. 371-373.

Fabrication and properties.
(L23, F23; ST, 4-53)

465-L.* (German.) **Prefluxing in the Hot Dip Galvanizing Process.** H. Bablik and M. Behlolavy. *Metalloberflache,* v. 11, Oct. 1957, p. 313-315.

Various methods of treating the base metal prior to immersion in the galvanizing bath. Drying process and drying time, removal of acid residues from pickling, temperature of pickling baths and its influence upon the galvanizing properties of the metal, and rinsing effects. Prefluxing with a mixture of ZNH_4Cl-$ZnCl_2$ showed best results in avoiding hard Zn precipitation.
(L16; *Zn,* RM-q)

466-L.* (German.) **On the Question of Current Distribution in Concentrated Electrolytic Solutions.** P. Csokan. *Metalloberflache,* v. 11, Oct. 1957, p. 316-320.

Ion migration follows certain preferred directions in the electrolyte identical with field lines which depend on the geometric form of the electrodes. The ions of the electrolyte are polarized, creating dipole ions. Electrolytic field strength follows the laws of the electrostatic, while the current distribution is not yet mathematically accessible. (Concluded.) 7 ref. (L17b)

467-L.* (German.) **Further Progress in Metal Spraying Techniques. Pt. 3.** H. Reininger. *Metalloberflache,* v. 11, Oct. 1957, p. 329-333.

Improved thermospray guns of German, Russian and Czechoslovakian design, some utilizing natural gas instead of acetylene. Treatment of the base metal by cleaning and roughing the surface with electro abrasives or with purely electric methods or with sandblasting;

also pickling methods. (To be continued.) (L23, L10c, L12g)

468-L.* (German.) **Preservation of the Solderability of Silver-Plated Parts During Storage.** A. Keil. *Metalloberflache,* v. 11, Oct. 1957, p. 334-335.

Best protection of Ag-plated parts against sulphur corrosion is found to be a thin Au plate. Another successful method is chromate passivation. A polyurethane resin coating affords good preservation and acts as a flux when soldered.
(L17, R10c, K7; 8-62, *Ag, Au*)

469-L. (German.) **Protection Against Corrosion by the Diffusion of Chromium Into the Surface of Workpieces.** G. Becker. *Werkstatt und Betrieb,* v. 91, Apr. 1958, p. 169-170.
(L15; ST, *Cr*)

470-L. (German.) **Designing Structures to Make Painting and Protection Against Rust Easy.** K. A. van Oeteren. *Werkstoffe und Korrosion,* v. 9, Apr. 1958, p. 197-202.
5 ref. (L26, T26, 17-51)

471-L. (Russian.) **Application of Sandblasting Machines in Radiator Manufacture.** E. M. Notkin, G. E. Kur and N. M. Aronshtein. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 1-7.

With properly determined air blast parameters sandblasting can be effectively applied to the production of radiator cores. (L10c, W2r)

472-L. (Book.) **Metal Finishing Guidebook Directory.** 26th Ed. 1958. 678 p. Finishing Publications Inc., 381 Broadway, Westwood, N. J.

Plant engineering, surface preparation, plating procedures, control, analysis and testing; directories of product classifications and trade names. (L-general, 11-67)

473-L.* **Problems in Simultaneous Heat-Hardening and Ceramic Coating of No. 420 Stainless Steel.** Edward L. Bradley. *American Ceramic Society, Bulletin,* v. 37, May 1958, p. 222-226.

Problems encountered during efforts to simultaneously heat treat and porcelain enamel. The cooling contraction curve for the metal can be useful in determining the optimum softening point which its enamel coating should possess.
(L27, J-general; SS)

474-L. Here's a Better Way to Prepare Metal for Enameling. *Ceramic Industry,* v. 70, June 1958, p. 94-95.

System insures no carry-over of hard-to-rinse soil into the rinse and eliminates many rejects caused by the carry-over of a soapy film into the subsequent pickling, nickel dip, neutralizer and ground coat application operations. (L27, L12g)

475-L. Protection of Structural Steelwork in Chemical Plant. Mark Waghorn. *Corrosion Technology,* v. 5, Apr. 1958, p. 103-105.

Surface preparation by blast cleaning, flame cleaning or power tool cleaning. Classification of exposure conditions; suitable organic protective coatings.
(L10, L26n, L26p, L26r; ST)

476-L. Neoprene and Hypalon for Chemical Plant Linings. C. H. J. Avons. *Corrosion Technology,* v. 5, Apr. 1958, p. 107-109.
(L26r, T29)

477-L. Hypalon Coatings. H. J. Lanning. *Corrosion Technology,* v. 5, Apr. 1958, p. 110-114.
(L26r)

478-L. The Protection of Vessels, Pipe Lines and Pumps With Neoprene Coatings. G. A. Curson. *Corrosion Technology,* v. 5, Apr. 1958, p. 115-116.
(L26r, T26q, T26r, W13d)

479-L. Epoxide Resins Versus Corrosion. L. M. Barakan and G. L. E. Wild. *Corrosion Technology,* v. 5, May 1958, p. 137-140.
9 ref. (L26p)

480-L. Properties and Applications of Cold-Cured Epoxy Resin-Based Coatings. *Corrosion Technology,* v. 5, May 1958, p. 141-142.
(L26p)

481-L. Epoxy Resins in Corrosion-Resistant Applications. P. A. Dunn. *Corrosion Technology,* v. 5, May 1958, p. 143-147.
(L26p)

482-L. Bitugel. New Anti-Corrosive Bitumen Composition. E. A. Duligal. *Corrosion Technology,* v. 5, May 1958, p. 152-155.
(L26a)

483-L. Decorative Etching and the Science of Metals. Cyril Stanley Smith. *Endeavor,* v. 16, Oct. 1957, p. 199-208.
13 ref. (L28, M20q, A2)

484-L. Determination of the Faradaic Impedance at Solid Electrodes and the Electrodeposition of Copper. J. O'M. Bockris and B. E. Conway. *Journal of Chemical Physics,* v. 28, Apr. 1958, p. 707-716.
(L17; Cu)

485-L. Factors Affecting Residual Stress in Electrodeposited Metals. Pt. 3. Joseph B. Kushner. *Metal Finishing,* v. 56, June 1958, p. 56-60.

A critical evaluation. (To be continued.) (L17, Q25h)

486-L.* Modern Silver Plating Practice. Lawrence Greenspan. *Metal Finishing,* v. 56, June 1958, p. 61-63.

Best practice includes first striking in a solution of very much lower Ag content and high free cyanide content. For steel the established procedure is to use a double strike, first in a solution containing a lower Ag content and some copper cyanide, and second in a conventional strike solution. For the nonferrous metals: brass, Cu, Ni and Ni alloys, only the second or conventional strike need be used. (L17; *Ag*)

487-L. Institute of Metal Finishing Holds 1958 Conference. R. Pinner. *Metal Finishing,* v. 56, June 1958, p. 66-71.

Held at Torquay, England, Apr. 15-19, 1958. Topics discussed included Ni and Cr plating, stress in metal deposits, porosity of electrodeposits. Informative abstracts provided. (L17, L-general)

488-L. Cleaning Stainless Work in the Plant. W. E. McFee. *Metal Products Manufacturing,* June 1958, p. 64.

(L-general, SS)

489-L. Mechanical Descaling and Drawing of Mild Steel Rod. Pt. 1. L. Marsden. *South African Engineer,* v. 49, Apr. 1958, p. 34-38.

(To be continued.) (L10e; ST, 4-55)

490-L. Process Upgrades Steel Parts. *Steel,* v. 142, June 9, 1958, p. 90-91.

Diffusing Cr into surface creates a hard case that resists wear, corrosion and oxidation. (L15; *Cr,* ST)

491-L. Platers Seek Better Tests. *Steel,* v. 142, June 9, 1958, p. 102, 105.

(L17c; *Cr, Ni*)

492-L. New Coating Process Gives Steel Drums Long Life. C. W. Schimpff. *Western Metalworking,* v. 16, May 1958, p. 57-59.

Centrifugal vinyl lining of steel drums, coupled with a high-temperature curing process, produces a uniform and improved lining to protect a variety of hard-to-package products. (L26p, W12c; ST)

493-L. (English.) **Researches on Buffing.** Yukio Tanaka. *Osaka University, Institute of Polytechnica, Journal,* v. 3, Mar. 1958, p. 27-34.

9 ref. (L10a; NM-j)

494-L.* (French.) **Effect of Metal on the Blistering of Powder Enamels in Thin Castings.** Francois Danis. *Fonderie,* v. 147, Apr. 1958, p. 175-178.

If during the enameling operation a sufficient amount of free oxygen is present in the casting, the graphite will utilize this oxygen in preference to that of the enamel. This hypothesis is advanced to explain the blistering of enamel coatings on castings having a sufficient oxygen content. 5 ref. (L27; 5-60, 9-72)

495-L.* (German.) **Flame Cleaning of Blooms and Semifinished Materials.** H. F. Habbig and A. Pfeuffer. *Schweissen und Schneiden,* v. 10, Apr. 1958, p. 135-137.

Effect of flame cleaning on the structure of the treated materials; cracking and method of prevention. Further applications of the process. (L10g; 4-52)

496-L. (Italian.) **Sandblasting of Metals as Preparation for Painting.** T. A. Turco. *Vernici,* v. 14, Feb. 1958, p. 137-147.

33 ref. (L10c)

497-L.* Priming Paints for Light Alloys. J. G. Rigg and E. W. Skerrey. *Institute of Metals, Journal,* v. 86, May 1958, p. 421-424.

At the end of a 10-year period, some of the paint systems on the light metals based on zinc chromate or zinc tetroxy-chromate primers require no more than cleaning or touching up. To a limited extent this is also true for paint systems based on iron oxide primers. Coatings based on red lead primer have not proved so useful. Zinc chromate and zinc tetroxy-chromate primer systems are preferred for composite structures of steel and light alloys. 4 ref. (L26n; EG-a39)

498-L. Roller Burnishing—a Low-Cost Method of Producing Smooth Surfaces. C. R. Morris. *Machinery,* v. 64, June 1958, p. 115-117.

(L10b, W2a)

499-L. Five Rules to Follow in Designing for Plating. *Materials in Design Engineering,* v. 47, June 1958, p. 118-120.

Design for uniform plate thickness; use smooth surfaces; provide for electrical contact; design for selective plating; provide for draining and venting. (L17, 17-51)

500-L. Multilayer Nickel Coatings. *Metal Progress,* v. 73, June 1958, p. 95-96.

Duplex and multiplex systems for Ni plating hold promise of giving bright plated work with better corrosion resistance. (L17; *Ni*)

501-L. Finishing Vauxhall Motor Cars. *Product Finishing (London),* v. 11, May 1958, p. 44-46, 49-51.

(L-general, T21a)

502-L. Techniques for Canning and Bonding Metallic Uranium With Aluminum. J. E. Cunningham and R. E. Adams. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 102-119.

Use of an Al-Si alloy layer to retard interaction between Al and U and to promote the transfer of heat across the interface. A metallurgical bond can be achieved by dipping Al and U in the molten alloy; a thin adherent layer of the compound U(Al,Si) is formed at the interface which acts as an effective diffusion barrier up to about 350° C. 10 ref. (L23, T11g; Al, U)

503-L.* (Japanese.) **Cladding Light Metals.** Eihachiro Tanaka and Tadatsugu Yoshiki. *Light Metals (Tokyo),* v. 8, Mar. 1958, p. 44-52.

Cladding behavior of materials with different flow resistance. Good bonding can be obtained by hot rolling if the pair of metals is sufficiently reduced in the rolling pass. With hot extrusion, the inverted method is recommended. With cold rolling some cracking and rippling occurred. Bonding behavior improves with increasing individual thickness ratio, difference in hardness of outside material had no influence on cracking or rippling. Over-stretching of softer metal caused rippling which resulted in cracking of the harder metal. 6 ref. (L23; EG-a39, 9-72)

504-L. Skin-Polishing. R. D. Edwards. *Aircraft Production,* v. 20, May 1958, p. 192-197.

Large-scale chip-abrasion equipment for finishing Vickers Vanguard integral wing-skin panels. (L10b, 1-52, T24a)

505-L. Flame Plating. Process Provides Wear Resistant Surfaces on Metal Parts. *Australasian Manufacturer,* v. 42, Apr. 5, 1958, p. 62-68, 71-72, 79, 80.

(L29n)

506-L. Automation in Plating? *Canadian Machinery,* v. 69, May 1958, p. 89-92.

At Honeywell Controls, Scarborough, Ont. (L17, 18-74)

507-L. Savings in Stainless Clad Steel. David T. Smith. *Chicago Purchasor,* v. 36, Jan. 1958, p. 63-67.

Manufacture, properties and applications. (L22; SS, ST)

508-L. Pre-Treatment of Metal for Painting. *Industrial Finishing (London),* v. 10, May 1958, p. 26-27, 52.

(L26, L10, L12)

509-L. Abstracts of Papers on Nickel Plating, Chromium Plating, Anodic Coatings and Coatings on Aluminum. *Industrial Finishing, (London),* v. 10, May 1958, p. 29-36.

(L17, L19; *Ni, Cr,* Al)

510-L. Sprayed Metal and Plastics Coatings. G. H. Jenner. *Inspection Engineer,* v. 21, Nov.-Dec. 1957, p. 125-131.

Discussion of metal powder and metal wire; methods of spraying and the various metals that can be coated by these methods. (L23; Al, Zn)

511-L.* Improved Baths Solve Lifting of Plated Circuit Foils. E. C. Rinker. *Iron Age,* v. 181, June 19, 1958, p. 118-120.

Use of gold plating gives smooth, wear resistant finish, due to fine-grained preferentially oriented crystal structure. New bath, using inorganic stress reducers, makes rhodium deposit stresses compressive, rather than tensile, and eliminates lifting of the plating. (L17, T1c; Au, Rh)

512-L. Anodic Coatings. *Mechanical World and Engineering Record,* v. 138, May 1958, p. 208-209.

Applications of hard anodizing of Al alloys in the engineering and machine building fields. (L19q, 17-57; Al-b)

513-L. Electropolishing. *Mechanical World and Engineering Record,* v. 138, June 1958, p. 274-275.

Advantages over manual polishing. (L13p)

514-L.* Alkaline Nickel Plating. Edward B. Saubestre. *Plating,* v. 45, May 1958, p. 479-485.

Uses equilibrium data for various complexing agents to calculate deposition potentials for Ni. Caustic and cyanide baths cannot be used for alkaline Ni plating; polyphosphates and ammonia are suitable inorganic complexing agents while dibasic carboxylic acids, alpha-

hydroxy carboxylic acids, alpha-amino acids and amines are suitable organic complexing agents; examples of alkaline Ni solutions. 30 ref. (L17; *Ni*)

515-L.* Research on Microthrowing Power and Leveling of Plating Baths. Ernst Raub. *Plating,* v. 45, May 1958, p. 486-492.

Structure, thickness and distribution of Cu and Ni electroplated on brass specimen with V-shaped notches, U-shaped notches and cylindrical test pieces to evaluate influence of shape on microthrowing power and leveling. Depth of notches ranged from 0.1 to 0.14 mm. and angles varied from 30 to 120°. Deposits were made from bright Ni proprietary bath, a Watts bath, cyanide Cu bath and sulphate Cu bath. 11 ref. (L17b; Cu-n, *Cu, Ni*)

516-L.* Magnesium and Protective Coatings for Magnesium. Harry A. Evangelides. *Plating,* v. 45, May 1958, p. 493-498.

History of production of Mg and early chemical and anodic treatments for reducing corrosion. Process operating conditions for HAE coatings, pretreatment, post treatment, corrosion resistance and other characteristics. (L17; Mg, *Cr*)

517-L. Chromallized Steel. Richard P. Seelig. *SAE Journal,* v. 65, May 1958, p. 42-44.

Chromium diffuses into the base metal and combines to form an alloy case which is an integral part of the base metal. The case will not peal, spall, chip or flake off. (L15; ST, *Cr*)

518-L. The Effect of Lead in the Galvanizing Bath on the Ductility of Galvanized Coatings on Steel. M. A. Haughton. *Sheet Metal Industries,* v. 35, June 1958, p. 453-458.

(L18, Q23p, 8-65; ST, Zn, *Pl,* 4-53)

519-L. Ultrasonic Cleaning of Steel Strip. *Sheet Metal Industries,* v. 35, no. 374, June 1958, p. 460-461.

(L10f; ST, 4-53)

520-L. Pin Down Titanium Pickling Variables. M. E. Komp and Dillon Evers. *Steel,* v. 142, June 23, 1958, p. 94-95.

(L12g; Ti-b)

521-L. Water Glass Solves Heat Treat Problem. *Steel,* v. 142, June 23, 1958, p. 100, 104.

Coated on reactive metals like Ti and Zr alloys, it prevents embrittlement and scaling at high temperatures. (L27, J2, 8-67; Ti, Zr, 4-53)

522-L. High Vacuum Vapor Coating. Theodore H. Crane. Paper from "1957 Conference", Society of Vacuum Coaters, p. 1-3.

Relates poor adherence for texture of Al coatings to mean free path and other process variables in vapor coating. 5 ref. (L25g; *Al*)

523-L. Racking and Masking Techniques for Metallic Deposition by High Vacuum. J. Gordon Seiter. Paper from "1957 Conference", Society of Vacuum Coaters, p. 4-8.

(L25g, W3g)

524-L. Refrigerated Vacuum Pumping. Howard Farrow. Paper from "1957 Conference", Society of Vacuum Coaters, p. 9-13.

Requirements for refrigeration equipment to condense water from vacuum pumping system used in evacuating chamber for vacuum coating. (L25g, W10g)

525-L. Vacuum Deposition of Functional Coatings. Chester Northrup and John Smith. Paper from "1957 Conference", Society of Vacuum Coaters, p. 14-17.

Uses of vacuum evaporated coatings by optical and electronics industries. (L25g, T1, X3, 17-57)

526-L. Tungsten Filaments for Vacuum Metallizing. Wilfrid G. Matheson and Ralph P. Ranger. Paper from "1957 Conference", Society of Vacuum Coaters, p. 18-25.

Fundamental factors concerning design and use of W filaments as heat sources for evaporation process in vacuum metallizing. (L23, 1-73, X24f, 17-57; W, 4-61)

527-L. Lacquering Techniques for Vacuum Metallizing on Metals and Thermosetting Plastics. Madison A. Self. Paper from "1957 Conference", Society of Vacuum Coaters, p. 26-30.

(L23, 1-73, NM-d30)

528-L. (German.) **Modern Wire Galvanizing Equipment.** Friedmund Rüb. *Draht,* v. 9, May 1958, p. 170-174.

(L16, 1-52; Zn, 4-61)

529-L.* (German.) **Adhesiveness of Vitreous Enamel and Chemical Composition of Cast Iron.** Alexander Hauttmann. *Giesserei,* v. 45, May 22, 1958, p. 301-304.

Influence of saturation degree and of carbon, silicon, phosphorus, manganese and sulphur content studied by means of "double-T" test on 600 specimens; structural transforma-

tions of cast iron heated up to enameling temperature; optimal composition of cast iron.
(L27, 2-60; CI)

530-L.* (Russian.) **Influence of Oxides on the Physical Properties of Steel Metallized Layers.** L. V. Krasnichenko and M. N. Shchirzhenskii. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 137-141.

During the process of electrometallization, at the moment of fusion the metal becomes saturated with air. Particles of metal in the air current are spherical and vary greatly in size. The outside surface of these globules is covered with oxides. These oxides adversely affect the physical properties of the metallized layer. They can be greatly improved by proper heat treatment. 3 ref. (L23; ST)

531-L. **Electroplating Applications of Quality Control.** W. E. Jones. *American Society for Quality Control, Transaction,* 1958, p. 339-350.

Barrel plating case studies.
(L17, S12)

532-L. **Hard Facing in Practice.** C. V. Whitehouse. *Australasian Engineer,* Apr. 7, 1958, p. 66-73.

Hard facing alloys and applications. (L24, L29n)

533-L. **Cleaning and Pre-Treatment of Metal Surfaces.** *Australasian Manufacturer,* v. 42, Feb. 1, 1958, p. 60-64.
(L12, L13, L14)

534-L. **Surface Preparation of Metals Prior to Painting.** C. G. Robilliard. *Chemical Industry and Engineering,* v. 10, Nov. 1957, p. 47-49.
(L10, L12, L14)

535-L. **Surface Preparation for Protective Linings and Coatings Used in Critical Service.** S. J. Oechsle, Jr., and K. G. LeFevre. *Engineers' Digest,* v. 18, Nov. 1957, p. 485, 514.
(L10, L13, L26)

536-L. **Porcelain Enamel—Corrosion Protection for Chemical Process Equipment.** *Industrial and Engineering Chemistry,* v. 50, June 1958, p. 75A-76A.
(L27, R-general, T29)

537-L. **Anodizing and Color Decorating Aluminum Products.** Donald Saffel. *Industrial Finishing,* v. 34, June 1958, p. 26-28, 30, 34, 36.
(L19; Al)

538-L. **Bell Helicopter's Finish; Something Very Special.** Fred Howard. *Industrial Finishing,* v. 34, June 1958, p. 38-40, 44.

Newly developed lacquer covering has many desirable features. Cleaning and pretreatment on Al, Mg and steel; preparation for final paint and drying.
(L26n, T24a; Al, Mg, ST)

539-L. **Job Shop Painting With Electrostatic Spray.** Peter T. Spera. *Industrial Finishing,* v. 34, June 1958, p. 56-58, 60, 62.

Applied to Al and Zn die castings. (L26; 5-61, Al, Zn)

540-L. **New Finishing System for Office Furniture at Los Angeles Plant of Art Furniture Co.** *Industrial Heating,* v. 25, June 1958, p. 1195-1196, 1198, 1210.
(L26n, L23, T10f; ST)

541-L.* **Phosphoric Acid Treatments for Steel. Pt. 1. The Nature of Coatings Produced by the Action of Phosphoric Acid on Steel.** M. Donovan, J. W. Scott and L. L. Shreir. *Journal of Applied Chemistry,* v. 8, Feb. 1958, p. 87-96.

Coating composition changes with time of exposure to atmospheric oxygen. Role of oxygen in the reaction mechanism. 20 ref.
(L14b; ST)

542-L. **Oxidation of Iron Pretreated for Porcelain Enameling.** L. E. Fussell and R. L. Hadley. *Journal of American Ceramic Society,* v. 41, Mar. 1958, p. 81-88.

The thickness of oxide layers formed on enameling iron at short times measured as a function of temperature to compare the effects of various pretreatments. 18 ref.
(L14a, L27, R1h; Fe-a)

543-L. **Hydrogen Treating Process for Steel.** J. H. Healy and J. D. Sullivan. *Journal of the American Ceramic Society,* v. 41, Apr. 1, 1958, p. 141-145.

Steel is exposed to cathodically generated hydrogen until a decrease in density and an increase in porosity is obtained. Upon the removal of a substantial portion of the hydrogen, glass may be applied to the steel and it will be free of high and low-temperature hydrogen effects. This process permits the use of nonpremium steels, nonbubbly mill additions and ground-coat compositions that have greater corrosion resistance than conventional ground coats. 6 ref.
(L27, P10m; ST, *H*)

544-L. Method of Boron Evaporation. Akira Hashizume. *Journal of Scientific Research Institute,* v. 51, Dec. 1957, p. 211-214.

Method of obtaining a boron layer by evaporation in which the necessity of temperature control is stressed. About 0.1 mg. per sq. cm. of boron layer is obtained by one run of evaporation on an Al disk 8 cm. in diameter to be used as the ionization chamber electrode. 4 ref. (L25; *B*)

545-L.* A Progress Report. Porcelain Enamels on Aluminum. Karl Kautz. *Metal Products Manufacturing,* v. 15, Apr. 1958, p. 63, 82, 90.

Comments on Al alloys, mill additions, metal preparation, drying and firing. (L27; Al)

546-L. What's New in Vacuum Metallizing? *Mill and Factory,* v. 62, Apr. 1958, p. 110-112.

(L23, L25, 1-73)

547-L. Non-Metallic Plating of Aluminum. John Starr. *Pacific Factory,* v. 88, Nov. 1957, p. 24-25.

Ceramic coatings of great wear resistance now produced electrochemically. (L27; Al-b)

548-L.* Now—Improved Corrosion Resistance for Plated Zinc Die Castings. *Precision Metal Molding,* v. 16, July 1958, p. 39-42.

Minimum porosity and stress-cracking of bright chromium plate about 0.03 to 0.08 mils thick is obtained at bath temperatures of around 130° F. and with ratios of chromic acid to sulphate of 120 to 1 to 175 to 1.
(L17b, 9-68, 9-72; Zn, *Cr,* 5-61)

549-L. A Glossary of Barrel Finishing Terms. *Precision Metal Molding,* v. 16, July 1958, p. 43-44.

(L10d; 11-67)

550-L. Corrosion and Oxidation Resistant Coatings for Metals for Operation at Temperatures From 1000 to 2400° F. John V. Long. *Society of Automotive Engineers, Preprint,* v. 46C, Apr. 1958, 14 p.

(L15, L23, L27; SGA-g, SGA-h)

551-L. Cathode Processes in Electrodeposition of Thorium From Molten Electrolytes. M. V. Smirnov and L. D. Yushina. *United Kingdom Atomic Energy Authority,* AERE Lib/Trans. 766, 1957, 11 p.

The polarization of a Mo cathode has been studied at 600, 700 and 800° C. in a molten eutectic mixture of lithium and potassium chlorides. 28 ref. (L17; *Th*)

552-L. Inorganic Corrosion Inhibiting Coatings. A. B. Smith and D. H. Gelfer. *University of Florida, Engineering Progress,* v. 1, Dec. 1957, p. 55-58.

4 ref. (L14, L26c, L23)

553-L* Protective Metallic Coatings. Charles L. Faust. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 170-201.

High-temperature aircraft applications demand oxidation resistance; thermal stability; coefficient of thermal expansion relative to that of the basis metal; propensity for diffusion alloying with basis metal at the interface; properties of such a diffusion alloy zone relative to the performance needs; high melting point of the coating and of the diffusion alloy zone. Various types of metallic coatings analyzed. 18 ref.

(L-general, T24, Q-general; SGA-h)

554-L. Effect of Contents of NaCN and NaOH in Zinc Plating Baths on the Mechanical Properties of Steels. I. I. Moroz and N. T. Kudryatsev. *Metallovedenie i Obrabotka,* v. 4, Apr. 1958, p. 25-28. (Henry Brutcher, Altadena, Calif., Translation no. 4184.)

Increase in the NaCn and NaOH content of the Zn plating baths lowers the mechanical properties of two steels containing Mn, Si, Cr and Ni, as a result of penetration of hydrogen, which increases with concentration of cyanide in the solution and with plating time. (L17a; ST, *Zn*)

555-L. (French.) **Surface Effects Encountered in the Electrolytic or Chemical Polishing of Some Metals.** D. Whitwham and P. Lelong. *Métaux Corrosion-Industries,* no. 391, Mar. 1958, p. 101-107.

(L12f, L13p)

556-L. (German.) **Graph-Type Calculations in Electroplating.** E. J. Adolf Stiasny. *Feinwerk Technik,* v. 62, Mar. 1958, p. 94-98.

(L17c)

557-L. (German.) **Mechanical Descaling of Sheets and Strip.** M. Reimann. *Industrie-Anzeiger,* v. 80, Mar. 21, 1958, p. 323-325.

(L10g; 4-53)

558-L. (German.) **Ultrasonics in Finishing.** Wilhelm Lehfeldt. *Schriften-*

reihe Feinbearbeitung, no. 26, 1958, 82 p.

Ultrasonic wave generation; ultrasonic cleaning; boring; deburring; welding. 92 ref.
(L10f, G17d, K6r, 1-74)

559-L. (German.) **Flame Cleaning.** Erich Theis. *VDI Zeitschrift,* v. 100, Mar. 21, 1958, p. 352.

(L10g)

560-L. (Russian.) **Gas Flame Metallization by Means of Fusion of the Surface Powder Layer.** L. V. Krasnichenko and M. M. Dubashinskii. *Vestnik Mashinostroenia,* May 1958, p. 70-71.

(L23)

561-L. (Book.) **Finishing Handbook and Directory.** I. S. Hallows, Ed. 501 p. 1958. Sawell Publications Ltd., 4 Ludgate Circus, London, E.C.4, England. (Free.)

Cleaning processes, finishing processes, bibliography, glossary, labels, directories of equipment, trade names and associations.
(L-general; 11-67)

562-L. (Book.) **Technical Papers Presented at 1957 Conference of the Society of Vacuum Coaters.** 33 p. 1958. Society of Vacuum Coaters, P.O. Box 3095, Cleveland 17, Ohio. $10.

Papers abstracted separately.
(L25g)

563-L. Vacuum Metallizing. *Pacific Factory,* v. 89, Mar. 1958, p. 32-34.

Widening application to products where good abrasion resistance is called for, such as automotive hardware, drawer pulls and plumbing fixtures. (L23, 1-73)

564-L. Bright Nickel Plating. A. M. Ozerov. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 61-69. (Translation by Consultants Bureau, Inc.)

In the electrodeposition of Ni by different types of electric current, use of alternating current is advantageous. Hypothesis to explain the formation of smooth, bright Ni coatings of low porosity by use of a pulsating current periodically varying in magnitude, and of an alternating current with an anodic component. 18 ref. (L17b; *Ni*)

565-L.* (Italian.) **Vitreous Enameling of Aluminum.** *Alluminio,* v. 27, Apr. 1958, p. 189-196.

Properties and applications of enameled Al; process details. 13 ref. (L27; Al)

566-L.* (Italian.) **Bright Silver Plating.** *Galvanotecnica,* v. 9, Mar. 1958, p. 63-71.

Types of baths, brighteners; chemistry of plating process; sequence of operations; effect of variables such as current density, pH and bath composition on brightness and hardness of deposits. 42 ref. (L17; *Ag*)

567-L.* New Technique Rids Plated Steel of Hydrogen Embrittlement. H. H. Johnson, E. J. Schneider and A. R. Troiano. *Iron Age,* v. 182, July 31, 1958, p. 47-50.

An initial very thin plate of Cd is deposited on the metal; the piece is baked for a short time to drive off hydrogen; plated again to bring thickness to desired level. Initial plating prevents further hydrogen embrittlement. (L17c, Q26s; ST, Cd)

568-L.* (German.) **Dip Titanium Coatings on Iron.** M. E. Straumanis and Y. P. Huang. *Metall,* v. 12, June 1958, p. 501-503.

Titanium coatings on iron are extremely corrosion resistant, except for the pores left in the coating. To find the pores, an NaCl solution was used, resulting in yellow spots on the surface. The pores can be eliminated entirely through light scraping and subsequent treatment with an $AgNO_3$ solution. Of ten specimens thus treated eight proved to be corrosion resistant. 6 ref. (L16, 9-68; Fe, Ti)

569-L.* (German.) **Practical Applications for Bohmite Coatings.** D. Altenpohl. *Metall,* v. 12, June 1958, p. 503-507.

Bohmite is a gamma AlO OH crystallized aluminum oxydehydrate. It develops when Al reacts with water or vapor at about 75° C. and forms a strongly adhesive coating about 0.2 to 2 microns thick, which is corrosion resistant. This process is recommended for kitchenware and wrappings as well as for containers and pipes. Additions of ammonia or triaethanol-amine accelerate the coating process. Apparatus for this process is described and tables and diagrams are given for thickness of coating, growth rate and applications. 16 ref. (L21; Al-b)

570-L.* (German.) **Chemical and Electrochemical Surface Treatment of Molybdenum and Tungsten.** H. J.

Boosz. *Metall,* v. 12, June 1958, p. 508-511.

A survey of the literature covering chemical etching and polishing, electrochemical potential, electrolytic etching and polishing, electroplating from aqueous solutions and from melts, electroplating with Cu, Au, Ni and Cr. 63 ref.
(L-general; Mo, W)

571-L.* (German.) Applications of Precious Metal Coatings. H. W. Dettner. *Metall,* v. 12, June 1958, p. 520-522.

Precious metals, especially Au and Ag, are used increasingly as electroplate for electrical purposes. The electric conductivity of Ag is excellent. A special electrolytic passivating process was developed for Ag to prevent oxidation under H_2S. Au is not as conductive but is more corrosion resistant. The softness of Au was compensated through hard Au deposits at room temperature which are also more wear resistant. Rhodium coatings on Ag increase heat resistance. 8 ref.
(L17; Ag, Au)

572-L.* (Spanish.) Metallization of a Hydraulic Press Cylinder. Arnulfo Espinosa. *Fusion de Metales,* v. 20, Mar-Apr. 1958, p. 21-23.

Inside walls of press required to support 600 tons pressure were rust protected by application of ¼-in. bronze coating. (L23, W24g; Cu-s)

573-L.* Nitric Acid Cleaning of Sensitized Type 304 Stainless Steel. R. G. Christman. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 121-123.

Cleaning of sensitized Type-304 stainless steels with 25% HNO_3 at 150° F. for as long as 16 hr. has no adverse effects. Care must be exercized to avoid residual acid deposits. (L12g; SS-b)

574-L. Prepaint Conditioning for Aluminum Die Castings. John C. Ruttle. *Die Casting Engineer,* v. 2, Mar. 1958, p. 14.

(L26n, 5-61; Al)

575-L.* Surface Finishing by Vacuum Metallizing. Balram K. Mahendra. *Indian and Eastern Engineer,* v. 122, Apr. 1958, p. 271, 273-275, 277.

Applications vary widely such as obtaining economical decorative finish three-dimensional effect of true metallic inserts, infinitesimal thickness coatings for precise fidelity, highly reflective, partly reflective, opaque or fully nonreflective surfaces, metallized coating on non-conductors, improved conductivity of substances and others. Characteristics of various coatings such as Al, Au, Ag, Pt, W, Ta, Mo, Ni, Cr are considered. (L23, 1-73)

576-L. The Surface Treatment of Magnesium Castings by the Fluoride Anodizing Process. J. K. Wilson and F. D. Waldron-Trowman. *Light Metals,* v. 21, June 1958, p. 186-188.

Process affects decontamination of undesirable metals on surface; provides for detection of outcropping oxide skins for flux inclusions.
(L19; Mg-b, 5-60)

577-L. Phosphating Treatments. Pt. 4. Ervin C. Tinsley. *Metal Finishing,* v. 54, July 1958, p. 66-69, 73.

Brief summaries of 103 U. S. patents. (L14b)

578-L.* Finishing Die Castings. Pt. 5. Chromate Conversion Treatments. Raymond Stricklen. *Precision Metal Molding,* v. 16, June 1958, p. 43-45.

Cleaning, chromate treatment and post treatments to produce chromate conversion coatings on Al, Mg, Cu, Zn and brass die castings.
(L14e; Al, Cu, Cu-n, Zn)

579-L. Special Finishes—and Their Uses. Pt. 1. B. M. Letsky. *Product Finishing,* v. 11, June 1958, p. 54-62.

Formulation and uses of hammer, opalescent, leather, hardboard, polyester, and stoving hardboard finishes. (L-general)

580-L. Finishing Facilities for a Modern Railroad. *Product Finishing,* v. 22, Mar. 1958, p. 24-35.

(L17a, T23, L26n, 18-67; Cr, Ag)

581-L. Electrochemistry and the Plater. Pt. 3. Fred G. Brune. *Product Finishing,* v. 22, Mar. 1958, p. 36-42.

(L17b, A3h; Zn, Ni, Cu)

582-L. Continuous Galvanizing by the Armco-Sendzimir Process. I. C. Gwynne. *Sheet Metal Industries,* v. 35, July 1958, p. 497-506, 534.

Description of new line installed at Ebbw Vale Works of Richard Thomas and Baldwins Ltd.
(L16; ST, Zn)

583-L. Metallizing and Its Application in Aircraft Gas-Turbine Components. Donald E. Hacker. *Weld-*

ing Journal, v. 37, Mar. 1958, p. 231-236.

(L23, T24b, Mo)

584-L. Steel Pickling: When Should It Be Used? *Western Metalworking,* v. 16, Mar. 1958, p. 58-60.

(L12g, ST)

585-L. Dimensional Changes of Aluminum Alloy Articles in Anodic Oxidation. A. V. Shreider. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 83-93. (Translation by Consultants Bureau, Inc.)

Nature of the dimensional changes is determined by the anodizing conditions and chemical composition and structure of the metal. Dimensional changes are strongly influenced by the method of preparing the surface before anodizing and by the configuration of the anodized articles. For minimum dimensional changes in anodizing for corrosion protection of precision parts, the surface should be prepared by the use of organic solvents (and not alkaline solutions), and the anodic oxidation should be carried out in 3% CrO_3 solution at 34-42°, at 40 v. for 45-60 min. 61 ref. (L19p, P10d; Al-b)

586-L. Electrochemical Tinning of Sheet Iron From Halide Solutions. V. P. Kochergin, T. A. Nimvitskaya and M. Ya. Vyunova. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 95-100. (Translation by Consultants Bureau, Inc.)

An increase of the cathode polarization in electrodeposition of Sn from solutions of simple Sn salts can be effected by addition of complex-forming inorganic compounds. The fluorides of ammonium and sodium act as such complex forms in halide solutions. (L17a; Sn, Fe, 4-53)

587-L. Dependence of the Anode Potential of Steel on the Electrolyte Composition in Electrochemical Polishing. N. P. Fedotyev and S. Ya. Grilikhes. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 239-244. (Translation by Consultants Bureau, Inc.)

(L13p; ST)

588-L. Electrochemical Liberation of Zinc on Aluminum Cathodes With Differently Treated Surfaces. D. P. Zosimovich and T. I. Kononchuk. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 245-253. (Translation by Consultants Bureau, Inc.)

Principal factor determining adhesion of Zn to Al is absence or presence of an oxide film on the Al surface. When an Al cathode is immersed in an electrolyte containing fluoride ions, the oxide film on the electrode surface is attacked and Zn is deposited on it. While the film remains thick, the metals will not adhere. Different states of the oxide film on the Al surface and different fluoride-ion contents lead to different rates at which the film is dissolved, and hence to differences in adhesion between the metals. 35 ref. (L17; Al, Zn)

589-L. Electrolytic Copper Plating From Ammoniacal Electrolyte for Local Protection of the Surface of Steel Articles in the Cementation (Carburization) Process. N. A. Marchenko. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 255-260. (Translation by Consultants Bureau, Inc.)

Ammoniacal electrolytes can be successfully used for direct Cu plating of steel parts for local protection of the surface against carburization. Operating conditions; room temperature, cathode current density 2-3 amp/dm^2, anode current density with soluble Cu anodes 2-3 amp/dm^2. 6 ref. (L17a; Cu, ST)

590-L.* (Italian.) **Coloring of Anodized Aluminum.** C. Pieri. *Alluminio,* v. 27, June 1958, p. 267-271.

Coloring of anodic coatings with synthetic coloring matter depends primarily on physical absorption phenomena which occur between electropositive Al oxide and electronegative coloring substance. In some cases (e.g., Al lacquers with phenolic colorants), chemical phenomena will also be present. General characteristics which colorants should have for different applications. (L19q; Al-b)

591-L.* (Italian.) **Painting of Light Alloys Used in Naval Construction.** R. Ferrero. *Alluminio,* v. 27, June 1958, p. 273-275.

Electrochemical corrosion of light alloys used in ship building; required characteristics of protective paints; resin-base paints which have given excellent results in actual use. (L26, R4b; Al-b, Mg-b)

592-L.* (Italian.) **Pretreatment of Metal Surfaces Prior to Painting.** *Pitture e Vernici,* v. 14, Mar. 1958, p. 233-236.

Mechanical, physical, chemical and ultrasonic methods of surface preparation. (L10, L12)

593-L.* (Spanish.) **Experimental Study of a New Metal-Coating Process.** Con-

tinuous Semi-Industrial Installation for Aluminum Coating of Iron Wire by Immersion in a Fused Electrolyte. Manuel Serra. *Revista de Ciencia Aplicada,* v. 12, May-June, 1958, p. 222-237.

Solutions were worked out to mechanical, metallurgical and chemical problems common to all immersion coating processes. For each bath composition a critical operating temperature was observed which coincides with temperature at which minimum thickness of intermetallic sub-layer is formed. Baths containing Cr, Mo and Be together provided coatings of best ductility, brightness and uniformity of surface. 9 ref. (L16; Fe, Al, 4-61)

594-L.* The Influence of Aluminum, Lead and Iron on the Structure and Properties of Galvanized Coatings. J. J. Sebisty and J. O. Edwards. *Mines Branch Research Report R5, Department of Mines and Technical Services, Ottawa,* Mar. 14, 1958, p. 1-47.

Immersion time and Al content of the bath had the most significant effect on such factors as coating weight, steel weight loss, iron content and alloy growth in the coating, and ductility and adherence of the coating. The bath temperature was also significant but to a lesser degree. The lead content of the bath was the most significant variable affecting coating appearance. (L16, 2-60; ST, *Al, Pb, Zn)*

595-L.* (Russian.) **Electrolytic Polishing of Machine Parts.** V. A. Zhikh. *Vestnik Mashinostroeniya,* v. 38, June 1958, p. 58-60.

New metal finishing method by use of electrolytes with direct current. Electrolytes consist of concentrated acids, usually sulphuric acid. The workpiece serves as anode and insoluble lead rod serves as cathode. 5 ref. (L13p)

596-L. Descaling and Cleaning of Titanium and Titanium Alloys. D. W. Stough. Battelle Memorial Institute (Office of Assistant Secretary of Defense), *U. S. Office of Technical Services,* PB 121640, Mar. 1958, 68 p. $1.75.

Acid pickle baths are generally used to remove scales formed at temperatures up to about 1100° F. Above this more drastic treatment is needed, such as molten salt treatment followed by acid pickling. Proprietary descaling methods; and descaling practices at the major producers of mill products. (L12g, L12h; Ti-b)

597-L. Automatic Hard Surfacing of Complex Curves. *Industry and Welding,* v. 31, July 1958, p. 37.

New automatic machine cuts manhours 40% and surfaces better, faster and more uniformly. Sampling, rework and distortion are reduced. A twin-arc oscillating welding head was mounted on a radial manipulator. (L24, 1-52)

598-L. Conveyor Allows Random Choice of Anodizing Treatment. Robert Nyquist. *Iron Age,* v. 182, July 31, 1958, p. 51-53.

Use of projections on anodizing racks and trip switches at appropriate steps in the cycle permits automatic selection or skipping of any desired step. (L19, W3g, 1-52)

599-L. American Can Opens Coil Stock Plant in Hammond, Ind. *Iron and Steel Engineer,* v. 35, July 1958, p. 142-143.

World's first plant devoted exclusively to processing tin and steel plate from coils for manufacture of metal cans will perform two basic functions—chemical coating of steel plate (black plate) for use in "tinless" cans, and shearing of huge coils of both tin plate and chemically treated plate into can-making sheets. (L16, 1-52, F29q, ST, *Sn,* 4-53)

600-L. Barrel Plating Is Finding Its Place. D. J. Fishlock. *Metalworking Production,* June 27, 1958, p. 1115-1121.

Suitability of work for barrelling depends on skill of the plater, and availability of a variety of work which can be mixed to give suitable loads. A certain amount of burnishing must be expected and angular parts may become appreciably eroded. Uniformity is less satisfactory than in vat plating. (L17)

601-L. Protection of Springs Made of Steel No. EI 723 Against Oxidation at High Temperatures. T. I. Volkova and Yu. N. Griboedov. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 37-40. (Henry Brutcher, Altadena, Calif., Translation no. 4222.)

Flat springs made of this steel are recommended for labyrinth packings in steam turbines. They functioned well up to 550° C., but beginning at 500° C. they became covered with scale. Various metallic glazes were tried and best results were obtained from a mixture of 60% metallic chromium, 39% alumina and 1% ammonium iodide. (L27, R1h, 2-62; ST)

602-L. Aluminum Coating of Iron by Vaporized Aluminum Chloride. S. A. Semenkovich and A. V. Smirnov. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 48-51. (Henry Brutcher, Altadena, Calif., Translation no. 4225.)

Corrosion resistance of mechanical parts may be considerably increased by treatment with monohalogens of Al. Under action of vaporized aluminum chloride a hard, heat resistant coating is formed on iron surfaces at 950 to 1000° C. Apparently an intermetallic compound, Fe_2Al, is formed. At higher temperatures the coating becomes softer and probably is made up of the eutectic mixture of Fe_2Al_5 and $FeAl_3$. 12 ref. (L25; Fe, *Al*)

603-L. (English.) **Effect of Cyanide on Electrodeposition of Copper-Tin Alloys.** Salah E. S. El Wakkad and Hassan Sabry. *Egyptian Academy of Sciences, Proceedings*, v. 12, 1956, p. 1-5.

10 ref. (L12d; Cu-b, Sn-b)

604-L. (French.) **Protection of Steel Parts Used in Building Construction.** P. Blancheteau. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 191-202.

Steel parts used as construction elements can have a life comparable with that of other materials if suitable care is taken to protect them against corrosion. Protective properties of paints, varnishes, metal coatings, vitreous enamels and other preparations; prior mechanical and chemical treatment of the surfaces. (L-general; ST, SGB-s)

605-L. (French.) **Development of Modern Techniques of Hot Tin Plating in Industry.** W. E. Hoare. *Métaux Corrosion-Industries*, Apr. 1958, p. 184-188.

(L16; Sn)

606-L.* (German.) **Viscosity of Various Flux Melts for Hot Dip Processes in Zinc, Tin and Lead.** Joseph Hille and Wolfgang Durrwachter. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 269-274.

Dynamic viscosities of various flux materials, such as zinc chloride, alkaline systems, ammonium chloride and ammine-type systems. Addition of alkali halides or ammonium chloride decreased the viscosity of zinc chloride. Oxides increased viscosity after saturation of the homogeneous solution. With iron oxide the degree of oxidation is of particular influence. Diagrams for viscosities given. 14 ref. (L16, P10f; RM-q, Zn, Sn, Pb)

607-L. (German.) **Investigations on the Formation of Protective Coatings During Cathodic Polarization of Steel Surfaces.** Heinrich Klas. *Archiv für das Eisenhüttenwesen*, v. 29, May 1958, p. 321-328.

Formation of protective coatings from $CaCO_3$ and $Mg(OH)_2$ on steel parts through cathodic polarization and their properties in diluted and undiluted ocean water, in acid and acid-free drinking water and in earth-type solutions. Current density-time diagrams and resistance-time diagram. Debye-Scherer photographs were taken, with $Mg(OH)_2$ and $CaCO_3$ as calibrating substances. Recommendations for correct polarization and protective potentials. (L21; ST)

608-L. (German.) **Protection Against Corrosion by Means of Coal-Tar Pitch Applied by the Colarit Flame Spray Method in Turkey.** Harald Stern. *Bau, Maschine und Technik*, Jan. 1958, p. 17-19.

(L26a)

609-L. (German.) **Varnish Fights Corrosion Successfully.** Ingo Latzem. *Chemische Rundschau*, Mar. 1, 1958, p. 114-118.

(L26n)

610-L. (German.) **Synthetics as Protective Coatings.** *Deutsche Farbenzeitschrift*, Mar. 1958, p. 87-88.

(L26p)

611-L. (German.) **Silicones as Agents for Surface Refinement and Impregnating.** W. Noll. *Deutsche Farbenzeitschrift*, Mar. 1958, p. 90-92.

(L26p; NM-a37)

612-L. (German.) **Significance of Pigments in Coloring and Protection Against Corrosion.** J. D'Ans and H. J. Schuster. *Farbe und Lack*, Feb. 1958, p. 73-77.

Corrosion prevention with red lead oxide and zinc powder. (L26n)

613-L. (German.) **Preliminary Treatment of Metal Surfaces for Finishing.** H. Kohlhase. *Feingeraete-Technik*, no. 1, 1958, p. 38.

Staining, sandblasting, phosphating. (L10c, L14b)

614-L. (German.) **Preliminary Treatment of Metal Surfaces for Finishing.** H. Kohlhase. *Feingeraete-Technik*, no. 2, 1958, p. 86-90.

Chemical and electrolytic oxidation of Al. 14 ref. (L12, L13n; Al-b)

615-L. (German.) **High-Vacuum Vaporizing Equipment in the Metallization of Synthetics.** W. D. Nassauer.

Kunststoffe, Apr. 1958, p. 166.
(L23; NM-d)

616-L. (German.) **New Techniques of Varnishing.** Fr. Stein. *Maschinenbau*, Dec. 1957, p. 353-354.
6 ref. (L26n)

617-L. (German.) **Microfinishing by Pressure Polishing.** K. Ahlgrimm. *Maschinenbau*, Apr. 1958, p. 102-103.
(L10b, 3-74)

618-L. (German.) **Behavior of Various Nickel Anodes in Electrolytic Nickel Baths.** E. Raub and A. Disam. *Metalloberfläche*, v. 12, June 1958, p. 161-167.
Microscope observations of various Ni anodes. Curves of anode potential versus current density. Sludge formation. (L17, W3h; Ni)

619-L. (English.) **Protection of Steel by Painting.** J. C. Hudson. *Schweizer Archiv*, Feb. 1958, p. 46-56.
19 ref. (L26n; ST)

620-L. (German.) **White Enameling Directly on Steel.** Arnim Petzold and Helmut Betzer. *Sprechsaal für Keramik, Glas, Email*, no. 2, 1958, p. 26-29.
(L27; ST)

621-L. (German.) **White Enameling Directly on Steel.** Arnim Petzold. *Sprechsaal für Keramik, Glas, Email*, no. 4, 1958, p. 71-73.
Preparation of steel for enameling. 6 ref. (L27, L12; ST; 4-53)

622-L. (German.) **Defects in Enameled Castings.** A. Thuermer. *Sprechsaal für Keramik, Glas, Email*, no. 9, 1958, p. 203-204.
3 ref. (L27, 5-60, 9-71)

623-L. (German.) **Majolica Enamels for Cast Iron From 1930-1958.** W. Heller. *Sprechsaal für Keramik, Glas, Email*, no. 9, 1958, p. 205.
(L27; CI)

624-L. (German.) **White Enameling Directly on Steel.** Arnim Petzold. *Sprechsaal für Keramik, Glas, Email*, no. 9, 1958, p. 205-207.
9 ref. (L27; ST)

625-L. (German.) **Modern Degreasing of Metal.** Dieter Jaenecke. *Vakuum-Technik*, Apr. 1958, p. 52-55.
(L12)

626-L. (German.) **Ultrasonic Cleaning and Degreasing.** H. Faehse. *VDI-Zeitschrift*, v. 100, Jan. 21, 1958, p. 92-93.
(L10f)

627-L. (German.) **Scouring of Large Gear Wheels.** Otto Ufert and Hugo Junklewitz. *VDI-Zeitschrift*, v. 100, Feb. 21, 1958, p. 209-215.
(L12, T7a)

628-L*. (Italian.) **Painting of Aluminum Exposed to Marine Atmosphere.** G. Luft. *Alluminio*, v. 27, Mar. 1958, p. 107-118.
Specimens of Al-Cu-Mg and Al-Mg alloys used in naval construction were given various types of anti-corrosion paint treatments to determine deformability, adherence, impermeability and physico-chemical stability of applied coatings. Detailed observations based on natural corrosion and accelerated corrosion tests are reported. Phosphate coating followed by undercoating of zinc chromate, polyvinylchloride paint was found to constitute best pretreatment prior to finish painting. 8 ref. (L26n, R3p; Al, *Cu, Mg*)

629-L. (Japanese.) **Finishing Metal Plates With Sand Slurries.** Sakaji Yamasita. *Japan Society of Mechanical Engineers, Transactions*, v. 24, May 1958, p. 302-306.
The working direction of the surface is set at an angle of 90° to the flow of the sand particles. Finishes are bastard file, dead smooth file, emery paper and buff. (L10c)

630-L. (Japanese.) **Study on Current Efficiency of Chloroplatinic Acid Plating.** N. Awa and Y. Yamamoto. *Research Institute of Technology, Nihon University, Journal*, v. 16, Dec. 1957, p. 268-271.
Current efficiency of the cathode in plating for 1 min. in each of eight kinds of plating solutions. (L17a)

631-L.* (Rumanian.) **Chemical Polishing of Aluminum and Its Alloys.** E. G. Popescu. *Industria Usuoara*, v. 5, Apr. 1958, p. 145-148.
Mechanism of chemical polishing; types of baths; influence of composition and structure of metal on successful polishing; equipment. 8 ref. (L12; Al)

632-L.* **Effect of Addition Agents on the Electrodeposition Stress of Nickel.** Hideo Ise. *Electrochemical Society of Japan, Journal*, v. 26, 1958, p. E18-E20.
Effects of various current densities, p-toulene sulphonamide as stress reducer, methylquinoline chloride as subbrightener, benzylnaphthalene sodium sulphonate as brightener, and sodium lauryl sulphate as antipitting agent.
(L17a, L17c, Q25k; Cu, Ni)

633-L. Application of Cermet Coatings. *Australasian Manufacturer,* v. 42, Mar. 1, 1958, p. 66-69.

Cermet powder, a Cr-B-Ni mixture, is combined with ceramic frit and applied to a metal base to provide hard, high-temperature resistant facing for metal parts.
(L27; ST, Cr, Ni, B, 6-70)

634-L. Rhodium Plating Techniques. R. R. Benham and I. J. Warwick. *British Communications and Electronics,* v. 5, Apr. 1958, p. 266-269.

(L17; *Rh*)

635-L. Developments in Hard Anodising of Aluminum. Joseph E. Trankla. *Light Metals,* v. 21, July 1958, p. 218-219.

(L19; Al-b)

636-L. Chemical Surface Protection of Light Metals. A. Pollack. *Metal Treatment and Drop Forging,* v. 25, June 1958, p. 236-238. (From *Metall,* Sept. 1957, p. 754-756.)

Previously abstracted from original. See item 25-L, 1958.
(L14; Al, Mg)

637-L. Plating With Ultrasound. Harry A. Reich. *Pacific Factory,* v. 89, Mar. 1958, p. 30, 46.

Ultrasound plating makes possible reduction of time, avoidance of common coating defects and processing of normally inaccessible, rusty and greasy parts. (L29, 1-74)

638-L. Bright Nickel Plating. Pt. 5. Brightening Agents. D. J. Fishlock. *Product Finishing,* v. 11, June 1958, p. 65-75.

Present state of knowledge on brighteners and brightening action. Types of brightening agents and mechanisms of nickel plating. 20 ref. (L17a; *Ni*)

639-L. The Production of Pre-Painted Strip. *Product Finishing,* v. 11, June 1958, p. 76-80.

General layout of Coated Strip Ltd. plant. Treatment of the strip; its applications in manufacturing. (L26; 18-67, 4-53, ST)

640-L. Electroplating Explained. A Course for the Working Plater. Pt. 4. Water and Aqueous Solutions. H. Hartley. *Product Finishing,* v 11, June, 1958, p. 99-103, 120.

(L17)

641-L. Chromized Steel. A New Low Cost, Heat, Wear or Corrosion Resistant Material. Richard P. Seelig. *Society of Automotive Engineers, Preprint, 30B,* Mar. 1958, 8 p.

(L15; ST, *Cr,* 8-74)

642-L. Abrasive Solves Finishing Problem. *Steel,* v. 142, June 30, 1958, p. 98-99.

Copper powder and abrasive pressed into pellets and sintered have superior properties.
(L10d; Cu, 6-67, Al, 5-60)

643-L. Application of Centrifugal Shot Descaling Plants in Bar Drawing Plants. Fritz Kottmeier. *Stahl und Eisen,* v. 78, Mar. 20, 1958, p. 358-364. (Iron and Steel Institute Translation no. 980.)

Previously abstracted from original. See item 405-L, 1958.
(L10c, F27; ST, 4-55)

644-L. (French.) **Surface Treatments. Pt. 2.** *Industrie Chimique,* v. 45, Apr. 1958, p. 98-101.

Theory of degreasing with alkaline washes; alkaline substances and their cleaning power; types of synthetic detergents and their uses.
(L12)

645-L. (French.) **Plastic Coatings on Metal.** Gerard Besson. *Industrie des Plastiques Modernes,* v. 10, May 1958, p. 8-17.

(L26p)

646-L. (French.) **Properties and Fatigue Strength of a Metallized Copper Surface.** J. Salokangas and P. Lehto. *Soudage et Techniques Connexes,* v. 12, May-June 1958, p. 173-181.

Behavior of a Cu layer sprayed on rolls of papermaking equipment. Fatigue tests show that the coating can sustain a load of 10^7 cycles. The quality of the deposit largely depends on operating conditions, and more particularly on wire feed and spraying distance.
(L23, Q7a; Cu, 8-67)

647-L. (German.) **Electrolytic Polishing of Steels.** Viera Rehakova. *Bergakademie,* v. 10, Apr. 1958, p. 241-244.

(L13p; ST)

648-L. (German.) **Chemical Methods in Protection and Finishing of Metal Surfaces.** R. Brodt. *Industrie-Anzeiger,* no. 94, Nov. 22, 1957, p. 17-19.

Phosphate, chromate and oxide coatings. (L14)

649-L. (German.) **Present Status of Flame Spray Technique.** A. Matting. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 707-708.

(L23)

650-L. (German.) **Structure and Valuation of Flame Spray Layers.** Hans-Dieter Seghezzi and Erich Gebhardt. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 708-713.

4 ref. (L23, M27)

651-L. (German.) **Steel Wires for Metal Spray Pistols.** H. Krautmacher and W. Püngel. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 716-719.

Properties of steel spray wires; determination of hardness of sprayed layers. (L23; ST)

652-L. (German.) **Corrosion Resistant Surface Finish.** K. A. van Oeteren-Panhäuser. *Seifen-Ole-Fette-Wachse,* v. 84, June 11, 1958, p. 371-376.

(L-general, R-general)

653-L. (German.) **Colored Aluminum.** *Technica,* no. 23, Nov. 8, 1957, p. 1309-1311.

5 ref. (L19; Al)

654-L.* **The Mechanism of the Electrochemical Polishing of Metals.** S. Ya. Grilikhes and N. P. Fedotyev. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 563-567.

Results indicate that it is essential to distinguish electrochemical grinding, accompanied by smoothing of the metal surface and electrochemical polishing, accompanied by an increase of the reflecting power of the metal. Smoothing of the microroughnesses of the metal surface in electrochemical grinding is the result of formation of a viscous salt layer near the anode or a salt film on the surface. (L13p)

655-L. **Investigation, by the Charging Curve Method, of the Nature of Local Passivity During Electrolytic Polishing of Copper.** G. S. Vozdvizhensky and A. I. Turashev. *Academy of Sciences of the USSR, Physical Chemistry Section Proceedings,* v. 114, p. 289-291.

17 ref. (L13p; Cu)

656-L. **Carbides Co-Deposited by Plating Boost Wear Resistance 5 to 1 or More.** *American Machinist,* v. 102, July 28, 1958, p. 80.

Ultra-hard carbides, too brittle to be fabricated, are plated onto nearly any base metal, forming an extremly hard, long-wearing surface. (L17; NM-a35)

657-L. **The Surface State and Anode Potentials of Copper and Nickel in Electrochemical Polishing.** N. P. Fedotyev and S. Ya. Grilikhes. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 677-680.

(L13p; Cu, Ni)

658-L. **A Study of Surface Carbides, Differential Steel Attack and Pore Formation in the Galvanizing Process.** J. J. Sebisty. *Department of Mines and Technical Services, Ottawa, Mines Branch Research Report, R8,* Mar. 14, 1958, p. 1-18.

Massive carbide inclusions on the surface of sheet steel may affect galvanized coatings, as may the type and degree of surface working. (L16, N8r; ST, 9-69)

659-L.* **A Survey of the Factors Controlling Metallic Diffusion From the Gas Phase.** R. L. Samuel. *Murex Limited Review,* v. 1, no. 18, 1958, p. 501-527.

Reviews literature on production of diffusion coatings to improve corrosion, oxidation or wear resistance of metals. Characteristics of diffusion coatings, types of diffusion mechanism, kinetic and thermodynamic aspects of diffusion processes. Examples of diffusion methods from the gas phase including chromizing of ferrous metals, Ni and Mo; siliconizing of ferrous metals and Mo. 34 ref. (L15; ST, Mo, Cr)

660-L.* **Spray Pickling.** J. M. Zander. *Canadian Ceramic Society, Journal,* v. 26, 1957, p. 13-16.

Use of sprays in all stages of the process instead of immersion to prepare metal for vitreous enameling. Because of the greater effectiveness of washing action provided by spraying the various solutions under 8 to 12 lb. pressure, a comparable chemical treatment is effected in a much shorter period of time. (L12g)

661-L.* **The Protection of Steel Structures in Salt Atmospheres.** H. E. Bright. *Corrosion Technology,* v. 5, Jan. 1958, p. 17-20.

Various combinations of processes were used on the Sydney Harbour Bridge. In surface preparation of steel for painting, sand blasting is the best method; red lead is a better rust-inhibiting primer than zinc chromate for imperfectly cleaned steel; tungsten oil phenolic paint vehicle provides a more waterproof paint than alkyd vehicle. Under shade and wet conditions, tung oil phenolic resin vehicle in two-coat finish is outstandingly better, and aluminum spray coating proved to be best. (L26n, R3p; ST)

662-L.* Fresh Look at Plating Problems. *Metal Progress,* v. 74, July 1958, p. 112-114, 146, 148, 150, 153-154, 156.

Improved surface preparation and specialized coatings can ease finishing troubles. Platers should shotpeen the steel prior to chromium plating if fatigue is a factor. Alloy plates, electroless nickel and hard anodizing are solving specific problems. (L17, L-general)

663-L. Electrolytic Deposition of a Tin-Nickel Alloy From Chloride-Fluoride Solutions. K. M. Tyutina and N. T. Kudryavtsev. *Academy of Sciences of the USSR, Proceedings,* v. 115-117, 1957, p. 37-39. (Translation by Consultants Bureau, Inc.)

Following conditions are recommended: electrolyte composition; 2.1-2.5 *N* $NiCl_2$ + 0.4-0.5 *N* $SnCl_2$ + 0.7 *N* NaF + 1.0 *N* NH_4F; pH = 4.0-4.5. Electrolyte temperature 45-55°. Current density from 0.5 to 4.0 amp. per sq. dm. Current efficiency 96-98%. Sn and Ni anodes with surface ratio $S_{Sn}:S_{Ni}$ = 1:20. Average anode current density 0.5-1.0 amp. per sq. dm. of total anode surface. (L17; *Sn, Ni*)

664-L. Investigation of Cathodic Polarization in Electrodeposition of Nickel-Tungsten Alloys. T. F. Frantsevich-Zabludovskaya and A. I. Zayats. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 764-769. (Translation by Consultants Bureau, Inc.)

Study of the cathode process for electrodeposition of Ni-W alloys from ammoniacal tartrate electrolytes. The alloys are deposited with considerable depolarization relative to W, and with slight depolarization relative to Ni. X-ray structural investigation of the deposits showed that they are single-phase solid solutions of W in Ni. 12 ref. (L17; *Ni, W*)

665-L. Electrodeposition of Gold-Copper Alloys. B. S. Krasikov. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 843-845. (Translation by Consultants Bureau, Inc.)

Practical possibility of obtaining Cu-Au alloys by electrodeposition from cyanide electrolytes. Procedure consists of the production of alloy coatings on Ag cathodes under various conditions, and analysis of the deposits for Cu and Au. In addition, the electrolytes used were also analyzed for Cu, Au and free cyanide. Electrolyte compositions are given. 7 ref. (L17; *Au, Cu*)

666-L. Enamel Defects Caused by Hydrogen. James K. Magor. *Canadian Ceramic Society, Journal,* v. 26, 1957, p. 20-24.

Enamel defects divided into two categories; high-temperature defects, such as blisters, pinholes, pits, blackspecks and copperheads; delayed and low-temperature defects, such as fish scales, shiners, pop-offs and bloats. 7 ref. (L27, 9-68, 9-52, 9-72)

667-L. Cooking Up a Moly Coat. *Chemical Week,* July 26, 1958, p. 62.

Hydrogen reduction of molybdenum pentachloride to yield Mo films. (L28; Mo)

668-L. Efficient Drag-Out Recovery in Barrel Nickel Plating. R. J. Maling. *Electroplating and Metal Finishing,* v. 11, June 1958, p. 184-189, 206. (L17a; Ni)

669-L. Experiences in Electroplating and Related Processes. J. Chadwick. *Electroplating and Metal Finishing,* v. 11, July 1958, p. 225-228.

Problems in Cd, Zn, Ni and Cr electrodeposition and electroplating and anodizing of Al. (L17, L19; Al, Cr, Cd, Ni)

670-L. Motor Body Finishing. A. A. B. Harvey. *Electroplating and Metal Finishing,* v. 11, July 1958, p. 233-235, 242.

Repair of metallic paint and Rotodip process of painting sheet metal components. (L16, L23, L26n; 4-53)

671-L. Developments in Chemical Cleaning. D. J. Fishlock. *Electroplating and Metal Finishing,* v. 11, July 1958, p. 239-242.

Properties and applications of Grisiron alkaline cleaners. (L12k)

672-L. Continuous Galvanizing Line. *Engineer,* v. 206, July 18, 1958, p. 102-104.

New line for strip up to 48 in. wide installed at the Ebbw Vale works of Richard Thomas and Baldwins, Ltd., has a potential output of 10 tons per hr. of galvanized steel in the form of coil or sheet. Based on Sendzimir process; fully automatic. (L16, 1-61, 18-67; *Zn,* ST)

673-L. Porcelain Enamels and Ceramic Coatings. Robert J. Fabian. *Materials in Design Engineering,* v. 48, July 1958, p. 103-118.

Survey of types, abrasion, corrosion, high-temperature, thermal, optical and mechanical properties; typical applications of porcelain enamel and ceramic coatings. Definition of

terms; factors in design of parts. (L27; NM-g34)

674-L. Annual Conference of the Institute of Metal Finishing, Apr. 16-19, 1958. *Metal Finishing Journal,* v. 4, May 1958, p. 155-180.

Abstracts of papers on Ni plate and anodized coatings on Al. (To be continued.) (L17, L19; Al, Ni)

675-L. Bright Silver Plating. *Metal Industry,* v. 93, July 25, 1958, p. 73-74.

British process produces mirror-bright finish through complete range of coating thicknesses; hard uniform deposits, high ductility. (L17; Ag)

676-L. Progress in Tinplate Lithography. J. Matthews. *Tin and Its Uses,* no. 42, Spring 1958, p. 7-10.

(L26b; SN)

677-L. Steel Mills Look to E3N12's for High Strength in High Heat. *Welding Engineer,* v. 43, July 1958, p. 32-33.

Weld deposited coatings. (L24, W29h; Ni)

678-L. (Italian.) **Specifications and Layout of an Electroforming Installation. Pt. 1.** Leopoldo Marzano. *Galvanotecnica,* v. 9, May 1958, p. 124-127.

(To be continued.) (L18, 1-52, 18-67)

679-L. (Italian.) **Specifications and Layout of an Electroforming Installation. Pt. 2.** Leopoldo Marzano. *Galvanotecnica,* v. 9, June 1958, p. 143-150.

(To be continued.) (L18, 1-52, 18-67)

680-L. (Russian.) **Chemical Coloring of Metal Articles.** I. Finarevskiy. *Promysl. Kooperatsiya,* no. 5, 1956, p. 15-17.

Electrochemical method of coloring in a mild galvanic bath, at about 20°. Eleven colors can be produced directly on a steel (or cast iron) surface as well as on Ni-plated and Cu-plated steel, and also on Cu and its alloys. The process requires very low current densities at constant current intensity. (L29; ST, Cu-b, *Ni*)

681-L. (Russian.) **Point Anodizing of Aluminum Alloys.** V. G. Kononenko and D. A. Lyukevich. *Trudy Khar'kovsky Aviatsionnogo Instituta,* no. 16, 1955, p. 27-36.

Procedure for correcting flaws of the oxide film on various parts made of Al alloys, by point anodizing with direct and alternating current in sulphuric acid and chromic acid electrolyte. Method is simple, cheap and dependable under conditions of aircraft production and operation. (L19; Al-b)

682-L.* Anodic Polarization of Titanium in Nonaqueous Base Etching Solutions. Morris Eisenberg and Robert E. DeLaRue. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 162-169.

Anodic polarization studies, coupled with rate studies as a function of current density, represent a reliable method for determination of the suitability of an electrolyte and of the optimum operational conditions; temperature and current density for anodic etching of Ti without causing a detrimental hydrogen embrittlement of the metal. 7 ref. (L13q; Ti-b)

683-L.* Finishing Die Castings. Pt. 6. Plating. E. G. Carlson. *Precision Metal Molding,* v. 16, Aug. 1958, p. 39-41.

The poor performance of Cu, Ni or Cr-plated die castings subjected to outdoor exposure is due to deposits which were thinner than specifications called for. Other reasons for failure include porosity, unsound castings, pitting or porosity in the electroplated deposit itself. Duplex Ni deposits over Cu improve the corrosion properties of the overall plating. (L17; 5-61, Cr, Cu, Ni)

684-L. (Russian.) **Effect of Anodic Passivation Method and Electrolyte Concentration on Porosity of Al_2O_3 Film.** A. F. Bogoyavlenskiy and N. V. Siletskaya. *Zhurnal Prikladnoi Khimii,* no. 8, 1956, p. 1295-1297.

Studies of porosity of anodic Al_2O_3 films formed on sheets of Al (D-16-T) alloy by the sulphuric acid, chromic acid and the carbonate methods. Porosity was determined by filling with mineral oil. Porosity of films formed by the sulphuric acid and carbonate method increases with increasing concentration of the electrolyte, while that of films formed by the chromic acid method is little dependent on the concentration. (L19, 9-68; Al)

685-L.* Application of the Ion Bombardment Cleaning Method to Titanium, Germanium, Silicon and Nickel as Determined by Low-Energy Electron Diffraction. H. E. Farns-

worth, R. E. Schlier, T. H. George and R. M. Burger. *Journal of Applied Physics*, v. 29, Aug. 1958, p. 1150-1161.

Ion-bombardment cleaning has been successfully applied to the (100) faces of Ge, Si and Ni, and to the (0001) face of Ti. The method is capable of producing surfaces which are atomically clean.
(L13, M22h; Ti, Ge, Si, Ni)

686-L. Can Vacuum Metallizing Replace Plating? *Metalworking*, v. 14, July 1958, p. 8-9.

(L25g; Al)

687-L. Phosphating Teatments. Patent Literature Survey. E. C. Tinsley. Rock Island Arsenal Laboratory. *U. S. Office of Technical Services*, PB 131356, Apr. 1957, 148 p. $3.75.

(L14b, 10-54)

688-L.* Coatings for Underwater Metal Surfaces in Fresh Water Exposures. Sol M. Gleser. *Corrosion*, v. 14, Aug. 1958, p. 377t-386t.

Tests to determine effectiveness of coats for underwater metal surfaces on lock and dam components along upper Mississippi River. Data on pigmentation formulas, pigment-vehicle ratios, vehicle composition, preparation of metal surfaces and longevity of primer and finished coats. Suitability of various vehicles, use of coal tar, asphalt, hot spray metal coatings, Al and rubber coatings. 4 ref.
(L26a, L26r, L26p, L26n, R4a)

689-L.* (German.) Present Status of Aluminum Bright Anodizing. R. Lattey. *Aluminium*, v. 34, July 1958, p. 382-389.

Theoreticl basis of bright (eloxal) anodizing in which Al surfaces are brightened and subsequently anodized without substantial loss of brightness. The uppermost metal layer is removed after mechanical polishing by chemical brightening or anodic solutions. Brightening effect is checked by measurements of reflection and by interference photographs. Important anodic and chemical brightening baths and process procedures. Possible applications. 10 ref.
(L12f, L13p, L19; Al-b)

690-L.* (German.) Chromate Coating of Aluminum. H. Ketterl. *Aluminium*, v. 34, July 1958, p. 398-405.

Corrosion resistance and other properties of chromte coatings. Performance compared with washed primers. Chromate coatings as base for enameling. Techniques in using Alodine-100 and Alodine-1200 baths. 26 ref. (L14c; Al-b)

691-L.* (German.) Procedures for Anodizing and Dyeing Aluminum for Architectural Applications. Pt. 1. G. E. Gardam and A. W. Brace. *Aluminium*, v. 34, July 1958, p. 392-397.

General conditions for anodizing and dyeing structural Al parts. Al alloys suitable for anodizing. Dyes recommended including certain stable inorganic pigments and organic dyes of medium stability. Sealing procedures. Unsatisfactory results of some practical appilcations due mainly to insufficient coating thickness and sealing.
(L19n, T26n, 17-57; Al-b)

692-L.* (German.) Effect of Polishing Materials on Luster in Barrel Polishing. M. Dreher. *Metallwaren-Industrie und Galvanotechnik*, v. 49, May 1958, p. 188-194.

Changes caused by chemical factors. Metal barrels can produce a harmful electrochemical potential, so barrels of rosin and acid-free aged wood are suggested. Chemical properties of water can influence the result. Choice of polishing compound determined by material of parts. The part surface should be free of oxides, sulphides and stains. The polishing material should not attack the surfaces of the parts or the balls, and should have good antifriction, foaming and emulsifying capacities. All remainders of pickling fluid should be washed way before polishing. (L10d, W3b)

693-L. Hydrogen Overpotential on Electroplated Copper-Tin Alloys. I. A. Ammar and H. Sabry. *Journal of Physical Chemistry*, v. 62, July 1958, p. 801-805.
(L17; Cu, Sn)

694-L. Finishing Big Parts in Barrels. *Precision Metal Molding*, v. 16, Aug. 1958, p. 43.

A modification of the standard barrel whereby the barrel or chip container is stationary and the workpieces are moved, but movement is not rotational. Parts are fixtured and movement between them and the chip-mass is secured by a reciprocating movement in a horizontal plane. Parts 5 ft. long and weighing from 50 to 52 lb can be finished. (L10d)

695-L. (Russian.) **Point Anodizing of Aluminum Alloys.** V. G. Kononenko and D. A. Lyukevich. *Trudy Khar'kovskogo Aviatsionnogo Instituta,* no. 16, 1955, p. 27-36.

Procedure for correcting flaws of the oxide film on various parts made of Al alloys, by point anodizing with direct and alternating current in sulphuric acid and chromic acid electrolyte. (L19; Al-b)

696-L. Western Electric's Modern Metal Finishing Plant. A. W. Cagle and E. J. St. Amand. *Metal Finishing,* v. 56, Aug. 1958, p. 48-52.

Equipment and layout at the new Lexington Rd. plant, Winston-Salem, N. C. (L-general, 1-52, 18-67)

697-L. Phosphating Treatments. A Comprehensive Patent Literature Survey. Pt. 5. Ervin C. Tinslev. *Metal Finishing,* v. 56, Aug. 1958, p. 70-72.

Fifty-six U. S. patents briefly annotated. (L14b)

698-L. Science for Electroplaters. Pt. 39. Organic Acids. L. Serota. *Metal Finishing,* v. 56, Aug. 1958, p. 73-75, 81.

(L17)

699-L. (Russian.) **Excessive Porosity of Electrodeposited Metals.** Ya. E. Geguzin. *Fizika Metallov i Metalovedenie,* v. 5, no. 3, 1957, p. 536-544.

14 ref. (L17, 9-68; Cu)

700-L. (Pamphlet.) **Bibliography on Electroplating Cobalt and Cobalt Alloys.** F. R. Morral. 16 p. 1958. Cobalt Information Center, Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

Encompasses literature on the electroplating of cobalt and its binary and ternary alloys to June 1957. (L17; Co, 11-67)

701-L.* Organic Finishing of Aluminum and Its Alloys. Lester F. Spencer. *Metal Finishing,* v. 56, Aug. 1958, p. 58-61, 69.

Procedures used in painting Al differ from those used for steel; the largest variable is the manner in which the surfaces are prepared for painting. Various types of finishes. 7 ref. (L26; Al)

702-L. Ceramic Coatings for Protection of High-Temperature Materials. Nathaniel Cannistraro. Paper from "Sheet Materials for High Temperature Service", American Society for Metals, 1958, p. 25-36.

Variety of coatings available can be grouped into three basic types: Coatings for low-carbon or low-alloy steels; stainless steels of either AISI 300 or 400 series; or super high-temperature alloys. Applications include coatings on engine parts such as combustion chambers, inlet guide vanes, turbine blades, afterburners and tail cones. (L27; CN, AY, SS, SGA-h)

703-L.* (French.) **Diffusion of Aluminum and Beryllium in Nickel and Nickel Alloys and the Protection Provided Against the Effect of Hot Gases.** H. Buckle and J. Moisan. *Recherche Aeronautique,* no. 64, May-June, 1958, p. 27-33.

Solubility of Al and Be in Ni is too low to provide good corrosion resistance to solid solutions obtained by conventional diffusion processes. With new diffusion technique, Al or Be-rich coatings composed of definite compounds (AlNi, $AlNi_3$, BeNi, Be_2Ni) can be applied to Ni and Ni alloys. Coatings obtained have Vickers hardness of 500 to 1500 kg. per sq. mm. and provide perfect protection against oxidation in open air up to about 1100° C. Al_xNi_y films are only slightly brittle, but in combustion gases they deteriorate at temperatures over 800° C. as a result of chemical reaction. Be_xNi_y coatings are chemically stable in combustion gases up to about 850° C., but have low ductility. 8 ref. (L15; Ni, *Al, Be,* SGA-h)

704-L.* Electropolishing. What, How and Why. John F. Jumer. *Metal Finishing,* v. 56, Aug. 1958, p. 44-47.

Surface conditions, regardless of metal or alloy, determine to a large extent the degree of successful electropolishing. Greatest contributing factors towards unsatisfactory results are: large grain size, nonuniform structure, nonmetallic inclusions, directional roll marks, salt or scale contaminations, overpickling and insufficient or excessive cold reduction. Fine-grained deposits are more important than bright electroplated items when electropolishing for true reflected finishes. (To be continued.) (L13p)

705-L.* An Introduction to Vacuum Metalizing. M. A. Self and John Scharnberg. *Metal Finishing,* v. 56, Aug. 1958, p. 54-57.

Parts to be metallized with Al are usually given a resin-base coat. Al staples are hung on W wire filaments near the center of a vacuum chamber. The temperature of the filaments is raised to 1200° F., which causes the Al to melt and flow over the filament surface. An increase in temperature to 1800° F. evaporates the Al which then radiates from its source, coating all areas in a direct line with a thin film. Comparison with Cr plating. (L23; Al)

706-L.* (Japanese.) **Visual Inspection of Paint Film and Choice of Paint.** Yuji Tsuji. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 21-26.

Odor, dryness, runs, sags and grain are inspected during painting. After painting, color, odor, brush mark, bubbling, pinholing and wrinkling are inspected. 48 ref. (L26n, S13d)

707-L. Preparation of Protective Coatings by Electrophoretic Methods. A. C. Werner and R. J. Abelson. Vitro Corp. of America. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131726, Feb. 1958, 26 p. $.75.

Process for depositing alloys to serve as intergranular diffusion barriers between the Mo base and the Ni-Cr layer. Multi-layer coatings of 80-20 Ni-Cr and Ni-bonded columbium and titanium carbide provided good oxidation and erosion resistance. The ballistic impact resistance requirement was fulfilled by inclusion of a 50% dense, 80-20 Ni-Cr. (L29p; Mo, *Ni, Cr,* SGA-h)

708-L.* (German.) **Anodic Behavior of Different Type Nickels in Plating Baths. Pt. 2.** E. Raub and A. Disam. *Metalloberfläche,* v. 12, July 1958, p. 193-197.

Examination of the electrolytic polarization of different Ni anodes by anodic dissolution. Rolled Ni anodes show high polarization; electrodeposited fine-grained Ni anodes show low polarization. When similar anodes are used, pure chloride baths give the lowest polarization, while bright baths show the highest. Measuring the anodic electrolytic efficiency showed slight differences, but in all cases was close to 100%. Sludge formation was smallest for rolled Ni anodes. (L17b; Ni)

709-L.* Some Observations on Aluminizing of Steel. A. N. Kapoor, A. B. Chatterjea and B. R. Nijhawan. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 167-181.

Mechanical deformability of hot-dip aluminized steel depends on the characteristics of the alloy layer. Growth of the alloy layer at a particular temperature was roughly parabolic, being governed by an empirical relationship which is given. Presence of other elements in the bath appeared likely to affect diffusion so the influence of Fe, Si, Cu, Ti, Zn and misch metal either singly or in conjunction were investigated. Presence of 0.25% misch metal with 0.4% Ti and 2% Si gave preferred coating. 11 ref. (L16, 2-60; ST, *Al*)

710-L.* Aluminizing of Steels by the Aqueous Flux Process. S. M. Arora, P. K. Gupte and B. R. Nijhawan. *Indian Institute of Metals, Transactions,* v. 11, June 1958, p. 57-72.

Flux is applied by dipping the article in a strong, hot aqueous solution of potassium fluoride containing traces of hydrochloric acid. Drying of fluxed material leaves a protective, oxide reducing and air-excluding film of salt. Preheated articles are then dipped in the molten Al bath maintained between 710-760° C. and withdrawn after 15-30 sec. During hot dipping in molten Al, potassium fluoride reacts in the bath forming potassium cryolite which diffuses away to the surface allowing clean steel to come in contact with molten Al. 16 ref. (L16; ST, *Al*)

711-L.* (German.) **Surface Protection by Whirl Sintering and Flame Spraying.** Erwin Gemmer. *Werkstoffe und Korrosion,* v. 9, July 1958, p. 421-423.

Whirl sinter apparatus for dip coating of metals with thin plastic. Flame spraying a plastic powder on heated metal. Sand blasting, wash primer and chemical treatments for the preparation of surfaces. Pigmenting and coloring methods; automation of whirl sintering processes. (L26p, L10, L12)

712-L.* (German.) **New Protective Silica Coatings on Metal Surfaces.** O. Loebich. *Werkstoffe und Korrosion,* v. 9, July 1958, p. 423-424.

New silica coating "Inverron" for metal surfaces can be applied easily, is noncombustible and resists temperatures up to 400° C. Shows good chemical resistance and does not injure metal luster. (L26; *Si*)

713-L.* (Italian.) **Anodic Oxidation of Light Alloys and Architectural Applications.** A. M. Bertazzoli. *Alluminio,* v. 27, July-Aug. 1958, p. 331-336.

History of industrial use of anodic oxidation in Italy; process; common defects in anodic coatings and methods of inspection and control; standards and quality, responsibility of suppliers of anodized items. (L19; Al)

714-L.* (Italian.) **"Victor Cromalugraf" Aluminum Printing Process.** *Alluminio,* v. 27, July-Aug. 1958, p. 342-344.

New decorative process can be used on bare Al in any of its possible finishes and on painted or anodized metal; provides permanent designs and colors for indoor and outdoor applications. Examples of architectural panels and smaller items for home, industry and office. (L26b, T26n; Al)

715-L.* **Hard Oxide Coatings on Aluminum Investigated.** *Industrial Finishing,* v. 10, July 1958, p. 36-37.

Effects of hard oxide coatings on properties of Al and its alloys. Corrosion resistance, abrasion resistance and stress-rupture tests were made. Effects of various coating treatments on abrasion resistance and effects of treatments on bending fatigue. (L14a, Q9, R-general; Al)

716-L.* **Application of Vitreous Enamels to Non-Porous Surfaces.** *Industrial Finishing,* v. 10, July 1958, p. 47-49.

Ways of applying coatings and advantage of each. Types of coatings, including various decorative finishes. (L27)

717-L.* (Japanese.) **Studies on Aluminum Enameling. Pt. 3. Pretreatment of Aluminum Plate for Borosilicate System Frit.** Toshio Yamada and Shinichiro Tomino. *Metal Finishing Society of Japan, Journal,* v. 9, June 1958, p. 206-210.

Effect of anodic treatment of Al plates to aqueous solution of borates or silicates prior to application of enameled frit on adhesion of enamel, impact bending and thermal shock tests. Lithium borate, sodium borate, water glass and potassium borate were effective for anodic treatment. Binary mixtures such as lithium borate and water glass gave even better results. Ternary mixtures also were effective. 5 ref. (L27; Al)

718-L.* (Japanese.) **Electrodeposition on Anodic Coating of Aluminum. Pt. 5. Electron-Microscope Observation of Anodized Coating.** Matsuhei Kishi. *Metal Finishing Society of Japan, Journal,* v. 9, June 1958, p. 213-217.

Structure of anodic coatings produced by anodizing Al in phosphoric acid, oxalic acid and sulphuric acid. Influence of bath composition, bath concentration, voltage and treatment time on porosity and structure. 7 ref. (L19, M27; Al)

719-L.* (Japanese.) **Studies on Aluminum Enameling. Pt. 4. Effect of Li_2O on Borosilicate System Frit.** Toshio Yamada and Takashi Sugiyama. *Metal Finishing Society of Japan, Journal,* v. 9, June 1958, p. 217-222.

Effect of varying Li_2O content from 1 to 10% in enameling frit for Al on adhesion, wetting power, gloss, corrosion resistance and thermal shock resistance of the enamel. Enamel with larger amounts of Li_2O gave the best performance when subjected to impact, bending, thermal shock and corrosion tests. 4 ref. (L27, Q-general; Al)

720-L.* **Babbitting of Cast Iron.** *Foundry Trade Journal,* v. 105, Sept. 4, 1958, p. 295-296.

Kolene process removes sand, scale, rust and grease from castings, as well as dissolving the graphite on and immediately below the surface, creating a chemically clean surface for tinning. (L12n; CI, SGA-c)

721-L.* **New Hard Coat for Aluminum.** *Steel,* v. 143, Sept. 22, 1958, p. 80-81.

Process gives porous oxide coating up to 0.006 in. thick, with wear resistance greater than anodized finishes. Costs slightly more than anodizing, less than Cr plating. (L14a, L19; Al)

722-L. Guide to Electrodeposited Coatings and Other Surface Treatments for Metals. D. E. Couch and J. W. Hensley. Naval Ordnance Test Station. *U. S. Office of Technical Services,* PB 131496, Sept. 1954, 29 p. $.75.

Quick, reliable guide to the properties and uses of electrodeposited metals and to other chemical and

electrochemical treatments used in metal finishing. Rapid evaluation of electrodeposited metals and other surface treatments. Definition of terms. Characteristics of electrodeposits, electrodeposited coatings, special chemical and electrochemical processes and special coloring processes for decorative and photographic purposes. (L17, Q-general)

723-L.* (Japanese.) **Hydrogen Overvoltage of Nickel-Phosphorus Electrodes in Alkali Solutions.** K. Sasaki and K. Sugiyama. *Chemical Society of Japan, Journal,* v. 61, June 1958, p. 650-655.

Electrodes prepared by the electroless method are used. Hydrogen overvoltage is observed in relation to time, current density and bath temperature. (L17; Ni)

724-L.* (Japanese.) **Experiments With Clear Lacquer Coating on Plated Zinc Die Castings.** Masahiro Uga. *Metal Finishing Society of Japan, Journal,* v. 9, June 1958, p. 210-213.

Variety of clear lacquers was applied to plated Zn die castings to compare adhesiveness and corrosion resistance of the lacquer coatings. A vinyl lacquer was found to be most practical. (L26n; Zn, 5-61, 8-12)

725-L. (Russian.) **Effect of Technological Factors on Porosity of Electrolytic Nickel Deposits.** G. S. Vasil'yeva. *Materialy po obmenu opytom i nauchnymi dostizhpniyami v meditsinskoi promyshlennosti,* no. 3, 1957, p. 31-42.

The effect of preliminary treatment (mechanical and chemical), composition of electrolyte and conditions of electrolysis on the porosity of Ni deposits. It was found that the better the mechanical treatment of the surface the less is the porosity. Passivation of the surface prior to Ni plating decreases the protective properties of the coating. Porosity is increased on contamination of the electrolyte with Fe and dextrin. (L17, 9-68; *Ni*)

726-L. **Six Ways to Safeguard Good Appearance, Long Life.** *Industrial Finishing,* v. 10, no. 121, July 1958, p. 28-29.

Cleaning methods during and after fabrication which safeguard the important qualities of stainless steel. (L10, L12, 17-52; SS)

727-L. **Good Finishing Is 'Keynote' to Accuracy.** *Industrial Finishing,* v. 10, no. 121, July 1958, p. 40-41.

Heat treating and various finishing processes used in producing a high-quality typewriter. (L-general, J-general, T10f, 1-61; ST, Ni)

728-L. **Continuous Galvanizing of Steel Strip.** *Metallurgia,* v. 58, Aug. 1958, p. 76-79.

New Armco-Sendzimir line installed at the Ebbw Vale works of Richard Thomas and Baldwins Ltd. (L16; *Zn,* ST; 4-53)

729-L. **Which Finish for Zinc Diecastings?** Roy Stricklen. *Metalworking Production,* v. 102, Aug. 15, 1958, p. 1431-1433.
(L-general; Zn, 5-61)

730-L. **Glass-Protected Steel.** *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. C10-C11.

Corrosion prevention up to 1500° F., with good adhesion and dielectric properties. (L27; ST, NM-g34)

731-L. (German.) **Influence of Biologically Polluted Waters in Electroplating.** K. Sommer. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Aug. 1958, p. 351-352.

Importance of proper filtration of water used in electroplating plants. Quick growing algae and fungi affect appearance (threadlike deposit under microscope) and quality of finishes. (L17, W10h, 9-71)

732-L. (Italian.) **Bonderizing of Light Alloys.** P. de Cerma. *Alluminio,* v. 27, July-Aug. 1958, p. 337-340.
(L14b; Al, Mg, Ti)

733-L.* **Choosing a Finish for Zinc Die Castings.** Raymond Stricklen. *Precision Metal Molding,* v. 16, Sept. 1958, 67-69, 80.

Guide to mechanical finishing: polishing, buffing, tumbling and burnishing; chemical coloring and polishing; electroplating—zinc, zinc chromate, copper-nickel-chromium; organic lacquers and enamels. 5 ref. (L-general; Zn, 5-61)

734-L.* **Metal Bonded Media for Barrel Finishing.** *Precision Metal Molding,* v. 16, Sept. 1958, p. 74-75.

Mixture of abrasive and Cu powders was formed into pellets in a die and the resulting parts sintered. When pellets lodged in holes or channels they were easily re-

moved by dissolving them in a solvent that would not attack the metal from which the part being polished was made. There was no noticeable fracturing, rate of media wear was slow, rate of cut was rapid and the surface finish produced was satisfactory. A comparison is made with aluminum oxide media. Superiority of the metal powder to produce small radii is clear. (L10d, W2a; NM-j)

735-L. The Nitric - Hydrofluoric Acid Pickling of Zircaloy-2. E. Burt Friedl, Warren E. Berry, Paul D. Miller and Frederick W. Fink. Battelle Memorial Institute. *U. S. Atomic Energy Commission, BMI-1270,* June 11, 1958, 34 p.

Acid concentration, bath contamination, and temperature investigated. Pickling rates were found to be linear with time. Contamination of the bath with metal ions found in Zircaloy-2 at concentrations below saturation also had little or no effect on the pickling rate. 3 ref. (L12g; Zr-b)

736-L. Descaling and Cleaning of Titanium and Titanium Alloys. D. S. Stough, H. S. George, E. B. Friedl, W. K. Boyd and F. W. Fink. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121640, Mar. 1958, 68 p. $1.75.

Scales formed on Ti and Ti alloys that have been heated in air up to about 1100° F. are generally removed by acid pickle baths. More drastic treatment is usually required when the metal is heated in air to above 1100° F. Proprietary descaling methods. Descaling practices at the major producers of mill products, such as billet, bars, plate, and especially sheet. (L12; Ti)

737-L.* Uniform Coatings Put on by Pressure Curtain Application. P. C. Bardin. *Industrial Finishing,* v. 34, Sept. 1958, p. 8-16.

New method, called "pressure curtain", of applying protective and decorative coatings on flat, curved, concave, fluted or molded surfaces of wood, metal and plastic products is fast and economical. Principle of "pressure curtain" application and the machine. Through the thin curtain of flowing material the uncoated stock is moved by flat conveyor belts. (L26n, 1-52)

738-L.* Protective Coatings for Steel. Pt. 1. Louis J. Nowacki and E. R. Mueller. *Industrial Heating,* v. 25, Sept. 1958, p. 1810, 1812, 1814-1816.

Selection and application of organic coatings, or paints. Types of coatings classified and characteristics of specific materials in each category related to present applications. (To be continued.) (L26; ST)

739-L.* Special Finishes and Their Uses. B. M. Letsky. *Product Finishing,* v. 11, Sept. 1958, p. 46-53.

Formulation and applications of various types of industrial finishes using lacquers. (L26n)

740-L.* (German.) **Anodizing.** Filip Schutra. *Metallwaren-Industrie und Galvanotechnik,* v. 49, July 1958, p. 275-279.

Anodized parts present excellent base for lacquer, synthetic resins, organic and inorganic dies. Preparation of Al before anodizing; mechanical buffing, polishing, chemical treatment when used for decorative purposes. Preparation of material; proper mounting of parts; volume and condition of baths, rinsing. Direct-current sulphuric acid method used for pure Al and Al alloys with 15% Si, or up to 20% total of Cu, Mg, Mn or Zn. Coloring between anodizing and sealing. Done by dipping, alternating between two baths with thorough rinsing in between. Coloring with gold and bronze. 9 ref. (L19; L14; Al)

741-L.* (German.) **Metal Cleaning as Physico - Chemical Problem.** Paul Westphal. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Aug. 1958, p. 312-320.

Complete cleaning means removal of all foreign matter (including oxides and other compounds of basic metal; metal chips and flakes; residues of polishing agents, oils and greases). Cleaning methods must be adapted to matter to be removed. Most material can be dissolved in related (heteropolar and homopolar) agents; for mixed group alkaline solutions can be used. Ideal cleaning solution would be one in which pickling, deoxidizing, degreasing and polishing (chemically or electrolytically) could be done at the same time. 8 ref. (L12)

742-L. (German.) **Degreasing of Metals in Plating Technology.** R. Weiner. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Aug. 1958, p. 320-336.

Necessity of careful cleaning of metal surfaces; degreasing does not include removal of oxides and other compounds of basic metal but deals with removal from surface of "impurities" mostly resulting from preceding operations. If two degreasing procedures needed, second degreasing always done electrolytically. Two basic methods are dissolving and emulsifying. These are always supplemented by mechanical methods (movements of parts in dipping; bubbling effects in boiling solutions; steady flow of solutions around and over parts by way of pumps; spraying of solution on parts). Advantages and disadvantages of different methods.
(L12, L17)

743-L.* (German.) **Degreasing and Cleaning of Steel Parts Before Applying Nonmetallic Coatings.** H. Rogner. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Aug. 1958, p. 337-342.

Alkaline solutions (inorganic salts mostly supplemented by soaps and emulsifiers) and organic solutions or solution compounds are used for degreasing; for deoxidizing and acid substances. Passivating agents may be acid, alkaline or neutral. For deoxidizing and rust removing the cheapest agents are hydrochloric acid and sulphuric acid, supplemented by inhibitors; sometimes phosphoric acid is used which forms a protective layer on surface.
(L12; ST)

744-L.* **High Speed Brass Plating.** E. J. Roehl. *Electroplating and Metal Finishing,* v. 11, Sept. 1958, p. 299-301.

New process for plating brass on steel strip is capable of operation at substantially higher speeds. Brass-coated and lacquered strip steel is used for the fabrication of hand-bag frames, curtain rods, pencil ferrules, etc. (L17; ST, Cu-n)

745-L.* **Hot Galvanizing Practice in the U. S. A.** A. T. Baldwin and W. H. McMullen. *Electroplating and Metal Finishing,* v. 11, Sept. 1958, p. 319-322.

Production of better coatings and a reduction in the amount of Zn lost in dross by-products. New methods to increase ductility, adherence and appearance of the coatings. (L16, 1-66; *Zn*)

746-L. Diffusion of Aluminum and Beryllium in Nickel and Nickel Alloys. H. Buckle and J. Moisan. *Engineers' Digest,* v. 19, Aug. 1958, p. 336-338.

New diffusion process by means of which surface layers of definite compounds of Al and Be (AlNi, $AlNi_3$, and BeNi, Be_4Ni) can be applied on Ni. Behavior of these layers at high temperatures in air and in the presence of combustion gases. 7 ref. (L15; Ni, *Be, Al*)

747-L. The Use of Hard Chrome Plating in Engineering. Cyril Wharrad. *Inspection Engineer,* v. 22, July-Aug. 1958, p. 74-79.
(L17; *Cr*)

748-L. New Pretreatment Thwarts Rust. H. W. Adams. *Iron Age,* v. 182, Sept. 18, 1958, p. 86-87.
(L12, R10b)

749-L. Uses Grow for Ceramic Coatings. F. D. Shaw. *Iron Age,* v. 182, Sept. 25, 1958, p. 94-95.
(L27)

750-L. Ten Painting Reminders for Steel Plants. Walter T. Yarhouse. *Iron and Steel Engineer,* v. 35, Sept. 1958, p. 129-141.

Techniques and table listing resistance of several paints to acids, alkalis, and various ambient conditions. (L26n; ST)

751-L. Racking and Masking Techniques for Metallic Deposition by High Vacuum. J. Gordon Seiter. *Plastics Industry,* v. 16, Sept. 1958, p. 38-42.
(L25g)

752-L. Bright Nickel Plating in India. *Product Finishing,* v. 11, Sept. 1958, p. 54-55.

First automatic machine for bright Ni plating.
(L17b; Ni-b, Cr, Cu)

753-L. Productivity of Finishing Operations. *Product Finishing,* v. 11, Sept. 1958, p. 56-60, 79.

Finishing operations on mobile cranes, bike prop stands, baby carriages and wheels, and slotted angle metal. (L26n)

754-L. Ultrasonics in Finishing. D. J. Fishlock. *Metal Industry,* v. 93, Aug. 8, 1958, p. 109-113.
(L10f)

755-L. Architectural Anodized Aluminum—Recommended Processes for Light-Fast Weather-Resistant Coatings. *Metal Industry,* v. 93, Sept. 5, 1958, p. 193-196.
(L19, T26n; Al-b)

756-L. Influence of Surface Characteristics of Tinplate on Dewetting by Lacquer. S. C. Britton and K. Bright. *Sheet Metal Industries,* v. 35, Sept. 1958, p. 679-684.
(L26n; *Sn,* 8-70)

757-L. (Book.) **Industrial Finishing Yearbook, 1958.** 248 p. 1958. Arrow Press Ltd., 1 Stamford St., London S. E. 1, England. 15 sh.

Technical handbook, buyers' guide and directory. (L-general)

758-L.* An Investigation of the Mechanism of Levelling in Electrodeposition. S. A. Watson and J. Edwards. *Institute of Metal Finishing, Transactions,* v. 34, 1956-1957, p. 167-198.

Levelling power, defined as a function of the deposit thickness obtained at the peaks and the recesses of a standard rough surface, is measured in Ni plating solutions. Effects of levelling power and cathode potential of variations in current density and in the concentration of a variety of addition agents. Cathode efficiency determined and distribution of addition agents investigated under selected levelling conditions. (L17b; *Ni*)

759-L.* A Contribution to Knowledge of the Cathode Polarization Phenomena of Nickel. R. Piontelli and G. Serravalle. *Institute of Metal Finishing, Transactions,* v. 34, 1956-1957, p. 293-316.

Cathodic behavior of Ni in various solutions (chloride, sulphate, chloride-sulphate, sulphamate, perchlorate, fluoborate) buffered with boric acid in different conditions of pH, current density and temperature. 15 ref. (L17, P15; Ni)

760-L.* Applications for Alkaline Descaling Cleaners. Edward R. Jorczyk. *Metal Finishing,* v. 56, Oct. 1958, p. 46-48, 55.

Typical production applications are removing heat treat scale from ferrous sheet metal parts other than stainless steel; removing carbon smut from partially Cu-plated ferrous alloy parts that are carburized; removing smut from parts that are stripped of Cu plate; cleaning parts prior to plating; removing rust from machined parts. (L12k)

761-L.* Electropolishing. Pt. 3. Less Commonly Electropolished Metals. John F. Jumer. *Metal Finishing,* v. 56, Oct. 1958, p. 67, 70.

Procedures and solutions for electropolishing cadmium, gold, magnesium, platinum, silver, tantalum, titanium, tungsten, zinc and zirconium. (L13p; Cd, Au, Mg, Pt, Ag, Ta, Ti, W, Zn, Zr)

762-L.* (German.) **Testing of Rhodium Baths by the Hull Method.** S. Dorner and L. Froels. *Metallwaren-Industrie und Galvanotechnik,* v. 49, July 1958, p. 299-305.

Rhodium is well suited for electroplating, and use in production of jewelry and precision instruments is increasing. Plating is similar to procedure in electroplating with other metals. Results of tests made with different metallic admixtures to baths. Damaging effects of Au, Cu, Ag. Sn and Zn. 4 ref. (L17; Rh)

763-L.* Multi-Color Finishes Applied Electrostatically. John Sedlacsik, Jr. *Industrial Finishing,* v. 34, Oct. 1958, p. 22-24, 28, 30.

System utilizes an array of airless variable-speed centrifugal atomizers for blending and atomizing different single solid color coating materials which are individually supplied at controlled rates to the inner bottom surface of each atomizer head by separate, variable-output, positive-feed displacement pumps to produce smooth multicolor effects. Process is capable of coating practically any products that can be moved through painting zone by conveyor. (L26n)

764-L.* The Hydra-Spray Process of Applying Paint Materials. John P. McAdams. *Industrial Finishing,* v. 34, Oct. 1958, p. 58-60, 62.

In this system, compressed air drives the pump, but it doesn't spray the paint. No compressed air reaches the spray gun; only thing that's fed to spray gun is paint under high pressure. This high pressure (1000 to 2000 lb.) is obtained from a reciprocating, double-acting air motor that is mechanically coupled by a connecting rod to a reciprocating, double-acting pump. (L26n)

765-L.* Electrodeposition of Gold and Platinum by Sel-Rex Processes. *Industrial Finishing (London),* v. 10, Sept. 1958, p. 37-38.

Gold plating can be applied for decoration and protection. Sel-Rex process is suitable for still and barrel plating. Important application is the plating of Cu printed circuits to protect them against corrosion and wear. (L17; Au, Pt)

766-L.* Electroplating Improves Properties of Iron Powder Articles. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 50, 52, 54.

Performance of various electroplates on iron powder parts. High-density and resin-impregnated parts have better corrosion resistance after plating than low-density parts. Copper in resin-impregnated parts reduces corrosion resistance. Acid sulphate bath produces better Cu deposits than a copper cyanide solution. Nickel sulphamate and zinc sulphate baths produce the best Ni and Zn plates. (L17; Fe, 6-72)

767-L.* New Way to Descale Titanium. *Products Finishing*, v. 23, Oct. 1958, p. 42-44.

Electrolytic process called "Ti-Brite". Formulation of the bath; hydrofluoric acid; nitric acid; sulphuric acid; water ferrous sulphate. The Ti article to be descaled is made the cathode and direct current (6 to 36 volts) is passed for 1-3 min. from this cathode to a Ti or ferrous metal anode. Current is reversed for 1-3 min. and then reversed again to pass current in the same direction first used. Treatment is continued until visual inspection shows that scale removal is such that remaining scale will be taken off in the rinse with a minimum of hand labor. (L13n; Ti)

768-L.* Properties and Uses of Catalytic Coatings. John F. Howe. *Products Finishing*, v. 23, Oct. 1958, p. 45-47.

Catalytic protective coatings are combinations of vehicles and rust-inhibitive pigments with a catalytic agent. They make possible a chemical treatment and rust-inhibitive coating in one application. Excellent adhesion and wetting properties, heat resistance, salt spray resistance and acid and alkali resistance. Used for all types of metal such as steel, stainless steel, Zn, Cd, Sn, Al, galvanized iron, Mg. (L29, R10b)

769-L.* (Czech.) Anodes for Chromium Plating With Baths Containing Hydrofluoric Acid. Otakar Mudroch. *Korose a Ochrana Materialu*, v. 2, no. 3-4, 1958, p. 45-48.

Experiments with anodes of different material and steel cathodes at 20-30° C. and with 10 amp. per sq. dm. anodic density. Pb-Sn alloy anodes, Pb-Sb and Pb-Sn recommended for anodes as well as for both tank linings. (L17, W3h, 17-57, Pb, Sn, Cr)

770-L. Self-Adhesive Tapes in Metal Finishing. *Electroplating and Metal Finishing*, v. 11, Sept. 1958, p. 303-308.

Types available and their principal characteristic. (To be concluded.) (L-general, R10f)

771-L. 'Ghosts' in the Saddle Department. Kerry Sloane. *Electroplating and Metal Finishing*, v. 11, Sept. 1958, p. 323-324.

Elimination of gray streak in the enamelled finish of bicycle frames. (L26n, 9-71)

772-L. Want Longer Part Life? Try Hardsurfacing. *Metalworking*, v. 14, Oct. 1958, p. 10-11.

Mild steel dust collector protected with ¼-in. welded hard surfacing is expected to last 6-8 times longer; create fewer maintenance problems. (L24; CN)

773-L.* The Influence of Aluminum, Lead and Iron on the Structure and Properties of Galvanized Coatings. J. J. Sebisty and J. O. Edwards. *Dept. of Mines and Technical Surveys, Ottawa, Canada, Mines Branch Research Report no. R5*, Mar. 1958, 47 p. $.25.

Influence of Al and Pb additions in iron-saturated baths on the structure and properties of galvanized coating prepared by dry galvanizing technique. Different levels of Al and Pb, and ranges of bath temperature and immersion time were studied using two grades of sheet steel. Statistical evaluation indicated that immersion time and Al content had most significant effect on coating rate, steel rate loss, Fe content and alloy growth in coating and in adherence of coatings. Pb content was most significant variable affecting surface appearance of coating. Accelerated corrosion tests suggest Al, and to a lesser degree Pb, had significant effect on promoting "white rusting" of coatings. 9 ref. (L16, 2-60; ST, *Zn, Al, Pb, Fe*)

774-L.* A Study of Surface Carbides, Differential Steel Attack and Pore Formation in the Galvanizing Process. J. J. Sebisty. *Dept. of Mines and Technical Surveys, Ottawa, Canada, Mines Branch Research Report no. R6*, Mar. 1958, 18 p. $.25.

Observations on effect of massive carbide inclusions present in steel sheet on the structure of galvanized

coatings. Behavior of carbides found to be dependent on temperature and Al content of galvanizing baths. Variation in galvanizing attack on two supposedly similar steels was found to be related to type and degree of surface working. Pore defects on the surface of coatings appear to be related to gas evolution accompanying flux reaction. (L16, 9-71; ST, *Zn*)

775-L.* New Protective Finishes for High-Temperature Resistance Materials. Alfred F. Hofstatter. *Product Finishing*, v. 11, Oct. 1958, p. 52-58.

Protective finishes for high-temperature materials include metallic coatings, paints and ceramic coatings. Base materials include Al, Mg and Ti alloys, alloy steels, stainless steels, Ni and Co alloys and Mo. Depending on the conditions of use, some of these may need no protection, while other conditions may call for some form of protective coating. (L-general; SGA-h)

776-L.* (Russian.) **Protective Coatings for Heat Resistant Alloys.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 33-37. (Henry Brutcher, Altadena, Calif., Translation no. 4251.)

Chromium plating 0.1 mm. thick on samples made of EI437B alloy increased their heat resistance by 16% at 750°, and 0.1-0.2 mm. thick plating on alloy EI 617 by 14% at 800°. Since electrolytic layers recrystallize at 800°, Cr plating is not recommended above that temperature. Enameling increases heat resistance of alloy EI 617 by 15% at 800°. For greater effectiveness enamel should be baked on the parts at low temperatures. 5 ref. (L17, L27; SGA-h, *Cr*)

777-L.* (Russian.) **Wear Resisting Chromium Plating of Worm Gears.** E. F. Zommer. *Vestnik Mashinostroeniya*, v. 38, Sept. 1958, p. 54-56.

Experiments conducted with aim of replacing bronze with cast iron. Specimens coated with porous and nonporous chromium gave adequate wear resistance Porous Cr gives best results. Cr plated gray iron is a good substitute for bronze. 4 ref. (L17, T7a, 17-57; CI, 18-12, *Cr*)

778-L. Influence of the Working Method on Growth and Various Characteristics of the Oxide Layer When Anodically Oxidizing in Sulphuric Acid. D. Lenz. *Aluminium*, no. 3, Mar. 1956, p. 126-135. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB39.)

(L19; Al-b)

779-L. Science for the Coatings Technologist. Pt. 11. Paint Additives: Driers and Anti-Skinning Agents. E. S. Beck. *Metal Finishing*, v. 56, Oct. 1958, p. 56-60.

Cobalt, lead, manganese, calcium, iron and zirconium used as drier metals.
(L26; Co, Pb, Mn, Ca, Fe, Zr)

780-L.* Electropalting Explained—a Course for the Working Plater. Pt. 5. Trichlorethylene Degreasing. H. Hartley. *Product Finishing*, v. 11, Aug. 1958, p. 60-67, 78.

Proper operational methods and safety devices insure against health dangers and unnecessary trichlorethylene wastage. Principles and operations of vapor, vapor-liquid and swill-type tanks. Rates of contamination and irrigation. (L12j)

781-L.* Staining of Copper Sheet and Strip and Its Prevention. W. H. L. Hooper. *Sheet Metal Industries*, v. 35, Aug. 1958, p. 611-613, 619.

Classifies the various types of stains according to their principal chemical characteristics, such as oxide and basic carbonate, sulphate, sulphide and redeposited metallic Cu. Methods of minimizing staining of Cu and their disadvantages.
(L12; Cu, 4-53)

782-L.* (French.) **Chemical and Electrochemical Finishing in the Automobile Industry.** R. Vacher. *Corrosion et Anticorrosion*, v. 6, Sept. 1958, p. 318-328.

When decorative effect as well as corrosion protection is desired for steel, Zn alloy, Cu or brass parts, Cr plating is indicated. For Al or Al alloy parts, anodic oxidation, including proper surface preparation, is sufficient. When no decorative effect is desired, Zn, Cd or Sn plating, or phosphate coating, provides corrosion protection. Surface preparation, bath characteristics, properties conferred on metal surface by these processes.
(L17, L19, L14b, T21, 17-57)

783-L.* Organic Coatings for Zinc Surfaces. P. Costelloe and E. Page. *Institute of Metal Finishing Bulletin*, v. 8, Summer 1958, p. 107-114.

Current commercial paint resins and their performances on Zn surfaces. Primers and wash primers and the effect of certain pigments. Formulation of chromate and phosphate passivation. (L26; Zn)

784-L.* Notes on the Application of Self Mottle Ground Coats. A. T. Issitt. *Product Finishing,* v. 11, Aug. 1958, p. 48-54.

Coats which are a mixture of regular or acid-resisting ground coat enamel and a super opaque Ti cover coat enamel give good resistance to thermal shock and abrasion. When a high proportion of white enamel is used in the mixture a Ni dip undercoat will give the ground coats good adhesion. Pickling, Ni dip solutions, cleaning, dipping equipment and layout, methods of dipping and procedures in applying these coats. (L27)

785-L.* (French.) **Corrosion Protection of Bridges and Viaducts of French National Railways.** Bernard Thomas. *Corrosion et Anticorrosion,* v. 6, Sept. 1958, p. 288-291.

Standard treatment for all metal structures of French lines consists of blast cleaning with crushed silica, brush application of a coat of pure red Pb, followed by one or two coats of heavy paint containing micaceous iron oxide. New anticorrosion paints and techniques are being tested, but results have been discouraging in test applications where atmospheric humidity and impurity are high.
(L10c, L26n, T26p; ST)

786-L.* Architectural Anodizing. *Light Metals,* v. 21, Oct. 1958, p. 328-329.

Recommendations for finishes of satisfactory appearance and long life are based on research into anodizing procedures, on weathering over prolonged periods in different environments and on the recently issued specifications for anodic films. Aluminium alloys used, texture, anodizing conditions, coloring and sealing. (L19, T26n, 17-57; Al)

787-L. An Engineering Study of Vacuum Metallizing. *U. S. Office of Technical Services,* PB 131542, Dec. 1956, 32 p. $1.

Feasibility of using the economical vacuum metallizing process in lieu of electroplating for coatings on ordnance material, with emphasis on electrical components. Rapid production of extremely thin metallic films on glass, metals and plastics. Al, Cr, Ti and Ni can be deposited in thin coatings (to 0.0001 in.) by use of W wire filaments. Multiple strands of W wire were used to produce thicker coatings but difficulties arose concerning the high temperatures required and the tendency of the charge metals to alloy with the filament material. L23, 1-73)

788-L.* Preparation and Properties of Clean High-Area Metal and Alloy Evaporated Films for Use in Surface Studies. S. J. Stephens. Paper from "1957 Fourth National Symposium of Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 34-37.

Preparation of films of Pd, Au and 60-40 and 80-20 Au-Pd alloys. Films characterized by chemical analysis, X-ray and electron diffraction studies and surface area measurements. Oxygen uptake by evaporated films.
(L25j, 1-73, M22; Pd, Au, 14-62)

789-L.* Evaporation Mode of Certain Vacuum Metal Distallation Source Configurations. L. E. Preuss and C. E. Alt. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 47-72.

Technique permitting qualitative survey and quantitative assay to be made of the distillation rate from the various regions of a simple metal evaporation source. Image formation achieved by condensation of radioactive metal distilland at image plane of a simple vacuum distillation camera. Autoradiographic process utilized to intensify metal image. The influence of surface tension, wetting, filament temperature and system pressure on distillation geometry studied for Au, Cr and W. (L25j, 1-73)

790-L.* Metallizing of Flexible Substrates. Phillip J. Clough. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 136-137.

Problems encountered in continuous metallizing of paper or plastic sheet material. Use of carbon-base crucible and evaporation of Al at high steady rate for periods of hours. Conditions for minimum heat transfer to substrate. Geometric arrangement of source to assure uniformity of coating. (L23, 1-73; *Al*)

791-L.* Vacuum Metallizing on Plastics. T. J. LaBounty. Paper

from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 138-142.

Plastics commonly metallized and characteristics that are important to commercial metallizer. Problems commonly encountered.
(L23, 1-73; NM-d)

792-L.* Continuous Evaporation of Refractory Metals by Electron Bombardment Without Using Support Materials. Norman Milleron. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 148-149.

Mo and Ti wires evaporated at rate of 0.05 g. per min. Wires bombarded with electrons after being fed through cool Cu tips. The cool tip permits a stable continuously evolving molten ball of metal to be held by surface tension on the parent wire. 8 ref.
(L25g; Mo, Ti, 4-61)

793-L.* Electroplated Metals on Niobium. John G. Beach. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 81-88.

Plating baths and conditions for plating Fe, Ni, Cr, Cu, Au and Pt on Cb. Adherence of as-plated metals; heat bonding at 1300° F.; diffusion characteristics of Cr or Cu and Fe on Cb at 1500° F. The as-plated adherence of Fe was improved by heat bonding. At 1500° F. Fe plate ultimately alloyed with Cb and formed a weak intermetallic alloy layer. 5 ref. (L17, Cb)

794-L. Sprayed Aluminum Reduces Compressor Clearances. Loyd E. Batchelor. *American Machinist,* v. 102, Oct. 20, 1958, p. 140-141.

Automatic metal spraying process that minimizes the blade-to-housing clearance in turboprop aircraft engine compressors.
(L23, L10c, T24b; Al, 18-74)

795-L. Lead Base Paints in Corrosion Control. N. J. Read. *Corrosion Prevention and Control,* v. 5, Sept. 1958, p. 61-64, 66-67.

(L26n; Pb)

796-L. Metal Spraying Applications. *Industrial Finishing (London),* v. 10, Sept. 1958, p. 34-36.

Besides providing a protective coating, metal spraying can be used to build up worn parts such as bearings, hence saving the cost of replacement. (L23, Al, Cr, Ni, Zn)

797-L. Non-Porous Platinum Electroplate in One Operation. *Industrial Finishing (London),* v. 10, Sept. 1958, p. 39.

Platanex produces a nonporous Pt electroplate, in any practical thickness, directly from the bath in one continuous operation. Fine-grained dull gray finish duplicates exactly the surface plated; offers greater corrosion resistance in high-temperature ranges than Rh plate, at no greater cost. Baths are simple and easy to operate, requiring only addition of replenisher concentrate and water for maintenance.
(L17; Pt)

798-L. Fluoride Anodizing Process Replaces Shot Blasting for Magnesium Alloys. *Industrial Finishing (London),* v. 10, Sept. 1958, p. 56.

Magnesium alloys can be cleaned with little pretreatment. Dimensional losses are small and no difficulties arise even when working to fine limits. (L13n, L19; Mg-b)

799-L. Sulphamic Acid Bath Solves Nickel Plating Problems. *Industrial Finishing (London),* v. 10, Sept. 1958, p. 58.

Nickel plate from sulphamate acid baths is free of tensile stress and is used in the processes of magazine printing, printed circuits, typewriter components, gramophone records and aircraft parts. (L17a; *Ni*)

800-L. Automatic Parts Washer at Ford Motor Co. Plant. Emil J. Frundel. *Industrial Finishing,* v. 34, Oct. 1958, p. 54, 56.

(L12e, W3e, 18-74)

801-L. Recent Advances in Control Systems for Continuous Processing Lines. C. P. Brooks and J. T. Bradford. *Iron and Steel Engineer,* v. 35, Oct. 1958, p. 129-135.

Improvement of control systems results in easier installation, maintenance; increased flexibility, improved performance of tin-plating installations. (L17, 1-52, 1-61; *Sn*)

802-L. Shot-Blasting Removes Scale Economically. Herbert Chase. *Machinery,* v. 65, Oct. 1958, p. 167-169.

Automatic system handles both sheet and coil stock; blasting both sides simultaneously and then oiling stock before it is stacked or re-coiled. (L10c; ST, 4-53)

803-L. Electroplating Explained. A Course for the Working Plater. Pt. 6. Electricity in the Plating Shop. Pt. 1. H. Hartley. *Product Finishing*, v. 11, Oct. 1958, p. 70-76.

Electricity in the plating shop with special consideration to generation, conversion and general supply arrangements. (L17, W11)

804-L. The Pickling of Copper Wire. Max Straschill. *Wire Production*, v. 7, Apr-June 1958, p. 3, 5-6.

(L12g; Cu, 4-61)

805-L. Hard Gold Plating. A. G. Atanasyants, N. T. Kudryavtsev and V. M. Karataev. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 926-930. (Translation by Consultants Bureau, Inc.)

Electrolyte composition has been found for producing Au-Ni alloy coatings of higher hardness than that of ordinary Au coatings. Optimum electrolysis conditions for deposition of Au-Ni coatings and a method for adjusting the electrolyte composition. (L17a; *Au*)

806-L. Electrochemical Methods for Decorative Surface Treatment of Aluminum Articles. P. V. Shchigolev. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 931-935. (Translation by Consultants Bureau, Inc.)

Procedure for anodizing treatment of electropolished Al in H_2SO_4 solution yields transparent oxide coatings which diminish the luster of Al very slightly. (L17c; Al)

807-L. Investigation of a Thiocyanate Electrolyte for Copper Plating. B. S. Krasikov and A. M. Gvozd. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 1012-1016. (Translation by Consultants Bureau, Inc.)

Recommended as a replacement of the unstable and poisonous cyanide electrolytes for Cu plating of steel. (L17a; *Cu*, ST)

808-L. Hard Zinc. K. Ruttenwit and E. Eichmeyer. *Metall*, v. 10, no. 314, Feb. 1956, p. 106. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1476.)

(L17; *Zn*, 8-62)

809-L. (German-French.) **Classification of Filler Metals for Weld Deposition.** G. M. Blanc. *Zeitschrift für Schweisstechnik*, v. 48, Sept. 1958, p. 246-249.

(L24, W29h)

810-L. (German.) **Protection of Iron and Other Materials With Rubber.** H. Ziegner. *Draht*, v. 9, Sept. 1958, p. 344-346.

Manufacture and use of rubber coatings for Fe, Al and brass. In one process, rubber plates are calendered and bonded together. (L26r; Fe, Al, Cu-n)

811-L. (German.) **Peen Plating.** H. Blum. *Metall*, v. 12, Sept. 1958, p. 814-816.

4 ref. (L29)

812-L. (Japanese.) **Media for Barrel Finishing.** Wataru Funabashi. *Government Industrial Research Institute, Nagoya Reports*, v. 7, Aug. 1958, p. 624-629.

8 ref. (L10d; NM-j)

813-L.* (German.) **Wire Tinning With and Without a Protective Salt Surface.** *Draht*, v. 9, Aug. 1958, p. 304-306.

Experiments with various tinning baths, especially with increased lead and a salt mixture consisting of 40 parts $NaNO_2$, 7 parts $NaNO_3$ and 53 parts KNO_3. No advantage seen in the use of a protective salt surface because small metal drops penetrate into the salt layer and increase the waste metal. (L16; ST, *Sn*, 4-61)

814-L.* (German.) **Vacuum Metallizing.** W. Koehler. *Metalloberflache*, v. 12, Sept. 1958, p. 262-267.

Materials suited for this process are glass, ceramics, porcelain, metals, most plastics, textiles, certain leathers, furs and special papers. Less suitable are materials containing larger amounts of softeners or solvents. The vapor pressure of material should be below the depositing pressure of 10^{-4} Torr, and no more gas should be liberated than the pumps can easily exhaust. 25 ref. (L23, 1-73)

815-L.* (Russian.) **Bright Copper Plating From Acid Baths.** V. P. Persianstseva, N. T. Kudryavstsev and V. M. Kalb. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 42-46. (Henry Brutcher, Altadena, Calif., Translation no. 4357.)

Process uses an electrolyte containing 250 g. per l. $CuSO_4;5H_2O$; 50 g. per l. H_2SO_4; 0.005 g. per l. thiourea and 0.5 g. per l. sodium salt. Current during deposition 10 amp. per sq. dm. Temperature of electrolytes 15-22°. Plating has hardness of 250 kg. per sq. mm. Application of this process to shaped

parts has resulted in three-fold increase in productivity of Cu acid baths and has greatly shortened the time of production cycle of three-layer plate. (L17; *Cu*)

816-L.* (Russian.) **Improving the Surface Quality of Metal by Electro-Mechanical Process.** B. M. Askinazi. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 49-53. (Henry Brutcher, Altadena, Calif., Translation no. 4359.)

Use of electromechanical polishing for work hardening machine part surfaces, using as test specimens steel 40Kh, 62 mm. in diameter and 25 mm. long. Some of the specimens were normalized and some quenched in water at 830° followed by annealing at 550°. Results show cleaner, harder surfaces with greatly increased wear resistance. (L13p; ST)

817-L.* **Electro-Polishing Aluminum Reflectors.** J. Nugent. *Electroplating and Metal Finishing,* v. 11, Oct. 1958, p. 352-353.

Use can be made of the gas flow in Brytal treatment to facilitate polishing of Al aircraft reflectors. The same applies to the chemical brightening of Al and to the bright dipping of brass in aqua fortis. Addition of caustic soda prolonged the life of the Brytal solution indefinitely and improved the polish obtained. (L13, L16, L19p; Al-b, Cu-n)

818-L.* **Bright Nickel Plating of Leaded Brasses and Bronzes.** Gianluigi Galli. *Electroplating and Metal Finishing,* v. 11, Oct. 1958, p. 354-355.

Lack of raw materials in Italy and their high costs has led to the employment of metals of inferior quality which cause difficulty in electroplating. Chemical drop tests on brass and bronze determine the presence of certain constituents such as Pb and Al. Condition of the surface, crystal structure and porosity of bronze or brass castings influence the adhesion of bright Ni plating. (L17b; *Ni,* Cu-n)

819-L.* **Vapour Deposited Coatings for Titanium and Titanium Alloys.** Andre Styka. *Industrial Finishing (London),* v. 10, Oct. 1958, p. 41, 43, 45, 47, 49.

Molybdenum was deposited on Ti by the decomposition of Mo hexacarbonyl in 40 different runs. The optimum Co:H_2 ratio seems to be approximately 3:1. Techniques developed produced adherent Mo coatings. Qualitative wear tests show that Mo coatings on Ti and Ti alloys have excellent wear resistance. (L25; Ti-b, *Mo*)

820-L.* **Sprayed High Melting Point Metals.** J. Cauchetier. *Metal Industry,* v. 93, Oct. 31, 1958, p. 374-375.

Mo, Mo alloys, W, Ti and Ta sprayed on sand-blasted, mechanically polished and electrolytically polished mild steel. Oxidation and adhesion of the layers. (L23; ST, *Mo, Ti, Ta*)

821-L. **Hard Facing.** R. T. Phillips. Paper from "Conference on Welding Engineering", *U. S. Office of Technical Services,* PB 131739, 1957, p. 179-202.

Characteristics of hard facing rods. Alloys are divided into five broad classifications; low-alloy Fe-base rods; high-alloy Fe-base rods; Co-base rods; Ni-base rods; cast tungsten carbides. (L24, W29h)

822-L.* (French.) **Impregnation of Copper and Copper Alloys With Plastic Materials and Protective Coatings.** Andre Roos. *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 39-47.

Density and mechanical properties of thermoplastic and thermohardening materials; impregnation processes; liquefied plastic coatings, method of application; properties of coatings; applications. 4 ref. (L26p; Cu)

823-L.* (French.) **New Contribution to the Study of the Polishing of Non-geometric Parts.** J. Colange. *Machine Moderne,* v. 52, Aug. 1958, p. 67-69.

Tests of surface roughness of alloy steels and light alloys hand polished with newly developed wheels made of a mixture of rubber and abrasive. Wheels permit surface finishing to mirror polish and are especially useful in manufacture and repolishing of metal molds where precision of dimensions is important. (L10b; NM-j, AY, EG-a38)

824-L.* (French.) **Chemical Nickel Plating.** J. L. Fiedler and J. J. Vanroyen. *Revue du Nickel,* v. 24, July-Aug. 1958, p. 53-63.

Brenner, Kanigen and Niphos processes; processes using hydrazine; properties of coatings; principal applications of these processes. 19 ref. (L28; *Ni*)

825-L.* (German.) **Nonferrous Castings. Products and Processes.** Joa-

chim Muller. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 30-32.

Applications of alloys based on Al, Mg and Ti. Methods of applying a variety of surface finishes to nonferrous castings by a whole range of mechanical, chemical and electrolytic processes. (L-general, 17-57; Al, Mg, Ti, 5)

826-L.* (German.) **Chemical Surface Treatment of Nonferrous Metals.** H. Keller and F. E. Faller. *Metalloberfläche,* v. 12, May, 1958, p. 145-149.

Literature review of chemical reactions in protective coating of Al by anodic and chemical oxidation, chromate coating of Zn and phosphate coating of Al. Properties of coatings. Pores sealed by treatment with dissolved chromic acid and dichromates or application of oils, waxes and lacquers. Coating processes suited for Cu, Ni, Fe, Cd, Zn, Al and Mg. (L14, L19; EG-a39)

827-L.* (German.) **New Degreasing and Protection Methods for Iron and Steel.** W. Rausch. *Metalloberfläche,* v. 12, Oct. 1958, p. 289-295.

Acid alkali phosphate surface cleaners of 4.8 to 5.8 pH produce a protective film against corrosion. Steps in surface cleaning by spraying: preliminary degreasing, degreasing plus protective coating, water rinsing, rinsing with chromic-acid/phosphoric-acid, drying. 5 ref. (L12, L14b; ST)

828-L.* (German.) **Modern Methods of Lining.** W. Fueller. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 557-559.

Problems of planning and constructing external heated (or cooled) containers with chemical, thermal and mechanical resistant linings; definition of the swelling power of linings. Effect of the swelling power upon the tensions in the coat and the lining under conditions of operation. Possibilities of thin linings in internal heated apparatus with outside heat insulation. (L22)

829-L.* (Russian.) **Formation of Circular Zones on Electrodes in the Electrodeposition of Metals.** V. V. Bondar and Yu. M. Polukarov. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 552-553.

Zones explained by variations in crystalline structure of the deposit caused by varying current intensity at different distances from the center. Characteristics of zones are influenced by the composition of electrolyte. Different metals and alloys have their special zone patterns. 8 ref. (L17)

830-L.* (Russian.) **Electrodeposited Bright Tin Plate on Sheet Metal.** A. I. Vitkin and T. P. Plotnikova. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 588-591.

Tinning process in which liquid Sn is used as an anode, a bath of melted 80% $SnCl_2$ + 5% $ZnCl_2$ + 15% KCl or 80% $SnCl_2$ + 5% $ZnCl_2$ + 15% KF or 75% $SnCl_2$ + 5% $ZnCl_2$ + 5% NH_4Cl_5 + 15% KCl or 64% $SnCl_2$ + 4.5% $ZnCl_2$ + 27% KCl + 4.5% $AlCl_3$ as an electrolyte and the infinite sheet metal strip as a cathode. (L17a; ST, *Sn,* 4-53)

831-L. Strip Preheat Ends Galvanizing Pot Downtime. Edward J. Udick and Charles A. Turner, Jr. *Iron and Steel Engineer,* v. 35, Aug. 1958, p. 145-149.

Preheat furnace has improved quality of soft, continuous-coated galvanized steel sheet and reduced equipment maintenance costs. Furnace with duct containing protective gas eliminates strip fluxing and maintains required bath temperature without external pot firing, which results in low Al addition requirements, negligible dross formation and improved coating adherence. (L16; 4-53, ST, *Zn*)

832-L. Wear and Tear of Enamelled Surfaces. J. W. G. Pedder. *Metal Finishing Journal,* v. 4, July 1958, p. 259-268.

Titania-based enamels are more abrasion resistant than other enamels, and underfiring increased their resistance. Experiments varying the incident of the shot and thickness of the cover coat of titania-based sheet iron enamel. Abrasion of the stove-enameled surfaces caused the film to disintegrate in flakes, similar to crazing in vitreous enamels; whereas, on the vitreous enameled surfaces, the relatively thinner tops of the bubbles were broken and the remaining structure then bore the force of abrasion with much more resistance. (L27, Q9n)

833-L. A Review of Zirconium Bath Enamels. W. A. Ross. *Metal Finishing Journal,* v. 4, July 1958, p. 269-275, 280.

Enamels which are opacified by Zr compounds crystallizing out of the melt during firing. Factors

which control the degree of opacity or reflectance and the size of the crystals. Tests made of constituents which have an effect on solubility of the zirconium oxide in enamels, including fluorine, the most important element. Operational information and composition of three typical baths. Properties of Zr and Sb enamels compared. 12 ref. (L27; Zr, Sb)

834-L. **Developments in Steel Shot and Its Applications to Vitreous Enameling.** D. W. S. Hurst and J. Bradshaw. *Metal Finishing Journal*, v. 4, July 1958, p. 276-280.

New metallic abrasives are genuine steel. Formerly, abrasives have always been manufactured from chilled cast iron. Shot-blasting machinery, typical of those used in the vitreous-enameling industry, must be changed when using this new abrasive. Steel shot increased the number of successfully enameled castings 8%. (L10c, L27, W2a, ST)

835-L.* (Japanese.) **Study of Dispersion Coating of Polytrifluorochloroethylene.** Kazuo Kato and Hideo Nagasaka. *Metal Finishing Society of Japan, Journal*, v. 9, July 1958, p. 252-256.

Considers change of shape of fused particle during baking. Mechanism of film formation and adhesiveness of film for dispersion coating of polytrifluorochloroethylene on metals. Strongly adhesive coatings obtained on Al and steel pretreated by grit blasting. Adhesiveness was low on Cu alloys unless they had been plated with Cr or Ni. (L26p; Al-b, ST)

836-L.* (Japanese.) **Relation Between Surface Potential of Metals and Adhesive Property of Organic Coatings. Pt. 2. Effect of the Phosphoric Acid Treatment of Aluminum on Its Surface Potential and Adhesion of Organic Coatings.** Bunnosuke Yamaguchi and Hirohiko Hattori. *Metal Finishing Society of Japan, Journal*, v. 9, July 1958, p. 257-260.

Surface potential of Al decreased and adhesion of organic coatings increased when the metal surface was treated with a mixture of phosphoric acid and ethyl alcohol. (L26p, L14b; Al-b)

837-L.* (Japanese.) **Diffusion-Anneal of Aluminum-Sprayed Iron and Steel.** Takashi Yamaguchi, Hideo Nagasaka and Takeshi Takei. *Metal Finishing Society of Japan, Journal*, v. 9, July 1958, p. 260-266.

Metallographic investigation of effect of various factors on the formation, structure and state of the diffusion layer obtained by heating Al sprayed on iron and steel. Structure and state of diffusion layer were essentially dependent on time and temperature of annealing and thickness of sprayed layer. Porosity and poor adhesion of the sprayed layers affected unformity of the diffusion layer. Effect of a sealer was advantageous when the sprayed Al layer was less than 0.2 mm. thick. 10 ref. (L23, J23, N1h; *Al*, Fe, ST, 9-68)

838-L. **Titanium Gets Glass Coat.** *American Machinist*, v. 102, Aug. 25, 1958, p. 88.

Ti sheets are protected from contamination by a water-soluble glass coating that is sprayed on before the sheets go into the heat treating furnace. (L26c, Ti, NM-f42)

839-L. **Di-Phase Cleaning and Electrostatic Spraying for the Protection of Slotted Angle.** *Corrosion Prevention & Control*, v. 5, Oct. 1958, p. 61-62.

(L10h, L26n)

840-L. **Deburring With Walnut Shells.** Dean Rockwell. *Die Casting Engineer*, v. 2, Sept. 1958, p. 11.

Shells have high abrasive quality, removing burrs and flashings well, but without peening or distorting surface of part. (L10c; NM-b, NM-j, 5-61)

841-L. **Finishing Kleenacage Bird Cages.** M. C. Dowdall. *Electroplating and Metal Finishing*, v. 11, Oct. 1958, p. 347-350.

Automation in electroplating. (L17, T10, 18-74)

842-L. **Protection Against Corrosion. Survey of Available Materials.** *Food Manufacture*, v. 33, Oct. 1, 1958, p. 411-415.

Rubber-based paints, protective finishes, epoxy resin paints, plastic linings. (L26, R-general)

843-L. **New Method for Etching Copper.** O. D. Black and L. H. Cutler. *Industrial and Engineering Chemistry*, v. 50, Oct. 1958, p. 1539-1540.

Cupric ion-acid process offers advantages over ferric chloride in the etching bath. (L13q; Cu)

844-L. Coatings Boost Metals Into High Heat Ranges. John V. Long. *Industrial Laboratories*, v. 9, Sept. 1958, p. 137-144.

Ceramics provide a degree of resistance to acids and bases, inhibit oxidation and intergranular corrosion, increase fatigue life, prevent carburization, resist attack by molten Zn and Al, modify surface emissivity or reflectivity, and maintain base material strength for longer periods in high-temperature environments. (L27; SGA-h)

845-L. Mechanized Valve Surfacing With the Oxy-Acetylene Flame. J. F. Barnes. *Industry & Welding*, v. 31, Oct. 1958, p. 81-82, 88.

Porosity, cracking and rough surfaces were eliminated.
(L24, T7b; Co-b)

846-L. Light-Fastness of Organic Dyes on Anodized Aluminum. R. C. Spooner. *Metal Finishing*, v. 56, Nov. 1958, p. 48-53, 61.

16 ref. (L19; Al-b, 8-73)

847-L. Finishing Zinc Base Die Castings. Lester Spencer. *Metal Finishing*, v. 56, Nov. 1958, p. 58-61.

(To be continued.)
L10; Zn-b, 5-61)

848-L. Chromium Plating on Sprayed Metal. R. de Buyer. *Metal Industry*, v. 93, Oct. 31, 1958, p. 373-374.

(L17; *Cr*, CI, 8-67)

849-L. Power Brushing for Finishing Without Burrs. *Tool Engineer*, v. 41, Nov. 1958, p. 110-112.

Power brushing eliminates maching marks and burrs which are sources of stress concentrations.
(L10e)

850-L. Ultrasonic Cleaning. Pt. 1 and 2. Genrokuro Nishimura and Seiken Shimakawa. *University of Tokyo, Faculty of Engineering, Journal*, v. 25, Mar. 1958, p. 262-274.

(L10f)

851-L. Electrolytic Regeneration of Sulphuric Acid Iron Pickel Solutions. H. Hohn, E. Pfitzer and G. Jangg. *Beiztechnik*, v. 6. no. 10, 1957, p. 109-113. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1417.)

(L12g)

852-L. Influence of the Method of Casting Aluminum on the Distribution of the Impurities and the Appearance After Anodic Oxidation. H. Richaud. *Revue de Metallurgie*, v. 51, no. 1, p. 13-15. (Also in *Revue de l'Aluminium*, v. 33, Nov. 1956, p. 1039-1043.) (Special Libraries Assoc. Translation Center, John Crerar Library. Chicago, Translation no. ASLIB-GB1.)

(L19, 3-69, E-general; Al-b)

853-L. Microstructure of Low-Carbon Steel Developed by Electropolishing and Electroetching. B. S. Kasatkin. *Zavodskaya Laboratoriya*, v. 24, *no. 7, 1958, p. 842-843.* (Henry Brutcher, Altadena, Calif., Translation no. 4345.)

(L13, M27; CN-g)

854-L. (Danish.) **Corrosion Protection of Steel Structures, Railroad Bridges.** Arne Jeppesen. *Ingeniren*, v. 67, July 1958, p. 405-426.

Surface cleaning methods, hot plating with Zn, metal spraying, painting with Zn and other paints. 11 ref. (L-general, T26p; ST)

855-L. (German.) **New Cleaning and Finishing Processes.** A. Hohmann. *Giesserei-Praxis*, no. 9, May 10, 1958, p. 169-172.

Sprue removal by flame cutting and grinding; barrel and sand-blast cleaning of castings, barrel polishing, roto-finishing.
(L10c, L10d, E24; G18, G22)

856-L. (German.) **Investigations on the pH-Value of Nickel Dip Baths.** L. Bosolorf and K. Muller. *Metalloberflache*, v. 12, May 1958, p. 150-151.

(L17a; Ni)

857-L. (German.) **Modern Vacuum Metallizing Equipment for Production and Research.** H. Bumm. *Metalloberflache*, v. 12, Sept. 1958, p. 273-277.

(L25)

858-L. (German.) **Process of Vacuum Metallizing.** W. Reichelt. *Metalloberflache*, v. 12, Sept. 1958, p. 278-288.

12 ref. (L25)

859-L. (German.) **Automatic Apparatus for Testing Cleansing Power of Solutions.** G. Wildbrett. *Werkstoffe und Korrosion*, v. 9, Aug-Sept. 1958, p. 521-524.

Apparatus tests the cleaning solutions automatically, rinses the sheet specimens with water and dries them in a current of warm air.
(L12)

860-L. (Italian.) **Synthetic Elastomers in the Struggle Against Corrosion.**

E. S. Wouteakis. *Vernici*, v. 14, May 1958, p. 403-405.
(L26p)

861-L. (Russian.) **Mechanism of Anodic Dissolution of Magnesium.** B. N. Kabanov and D. V. Kokoulina. *Doklady Akademii Nauk SSSR*, v. 120, no. 3, 1958, p. 558-561.
4 ref. (L19; Mg-b)

862-L. Phosphating Treatments. A Comprehensive Patent Literature Survey. Pt. 7. Ervin C. Tinsley. *Metal Finishing*, v. 56, Oct. 1958, p. 72-73, 82.
Brief annotations covering 35 U. S. patents. (L14b, 11-59)

863-L. Science for Electroplaters. Pt. 41. Amino Acids. L. Serota. *Metal Finishing*, v. 56, Oct. 1958, p. 74-76.
(To be continued.) (L17a)

864-L. Vibratory Finishing. *Precision Metal Molding*, v. 16, Oct. 1958, p. 69.
Through the proper application of vibratory motion, barrel finishing, without rotation, can be speeded up markedly. (L10d)

865-L. Job Shop Painting of Die Castings. *Precision Metal Molding*, v. 16, Oct. 1958, p. 72-73.
Electrostatic spray units applied to Zn and Al die castings. (L26; 5-61, Al, Zn)

866-L. Industrial Electrodeposition of Zinc on Steel Sheet. Principal Advantages and Range of Application. G. Pieltain. *Corrosion et Anticorrosion*, v. 14, no. 7, 1956, p. 233-240. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. INSDOC-2248.)
Previously abstracted from original. See item 649-L, 1956. (L17; *Zn*, ST)

867-L. Cold Zinc, a New, Remarkable Surface Protection. I. C. Fritz. *Werkstoffe und Korrosion*, v. 6, Nov. 1955, p. 521-523. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1475.)
Previously abstracted from original. See item 214-L, 1956. (L15; *Zn*)

868-L. Aluminum Coating of Iron and Ferrous Metals. L. Grand. *Revue de l'Aluminium*, no. 239, Jan. 1957, p. 63-73. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB39.)
Previously abstracted from original. See item 144-L, 1957. (L15; Fe, *Al*)

869-L. Anodic Potential of Steel as a Function of the Composition of the Electrolyte Used in Electrochemical Polishing. N. P. Fedot'ev and S. Y. Grilikhes. *Zhurnal Prikladnoi Khimii*, v. 30, 1957, p. 233-239. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-65J17R.)
(L13p; ST)

870-L. Polarization Method of Smoothing in the Electrolytic Polishing of Metals. S. I. Krichmar. *Doklady Akademii Nauk SSSR*, v. 100, no. 3, 1955, p. 481-484. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 4-4378.)
(L13p)

871-L. (Italian.) **Specifications of an Electroforming Plant. Pt. 3.** L. Marzano. *Galvanotecnica*, July 1958, p. 169-174.
(L18, W10a)

872-L. Acid Copper Plating on Aluminum. J. T. N. Atkinson. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 24-27.
Acid Cu solution containing oxalates, pyrophosphates, ammonia and triethylamine eliminates special pretreatments, zincate dips, etc. 12 ref. (L17a; Al-b, *Cu*)

873-L. Anodic Polarization of Titanium in Nonaqueous Base Etching Solutions. Morris Eisenberg and Robert E. De LaRue. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 162-169.
7 ref. (L13q; Ti)

874-L. Electrodeposition of Iron-Molybdenum Alloys. L. O. Case and Albertine Krohn. *Electrochemical Society, Journal*, v. 105, Sept. 1958, p. 512-520.
Electrodeposit alloys which are bright and adherent in thickness of few hundredths of a millimeter. 57 ref. (L17; Fe-b, *Mo*)

875-L. Production-Line Surfacing With Tungsten Carbide Particles. Russell Priest. *Industry & Welding*, v. 31, Nov. 1958, p. 32-33, 52.
Hard surfacing drill pipe with automatic tungsten arc gas shielded welding. WC particles fed into the molten pool. (L24; W, C, NMa-35)

876-L. Aluminum-Bronze Overlay Deposited Without a Defect. Bob Ohmstede. *Industry and Welding,* v. 31, Dec. 1958, p. 48, 51.

Surfacing a steel floating head and steel tube sheet by depositing 300 lb. of wire in 50 hr.

(L24; ST, Al, Cu-s, 4-61)

877-L. Hard Anodize, Hard Chrome on Aluminum. *Western Metalworking,* v. 16, Aug. 1958, p. 21-24.

Aircraft parts of Al with hard finishes.

(L17, L19, T24c; Al-b, 17-57)

878-L. Abrasion Resistant Hard Facing Boosts Oil Drilling Parts Life, Productivity. Paul Richardson. *Western Metalworking,* v. 16, Aug. 1958, p. 40-41.

(L23, T28k; ST, SS)

SECTION M

METALLOGRAPHY, CONSTITUTION and PRIMARY STRUCTURES

1-M. Hydrogen-Uranium Phase Diagrams. M. W. Mallett and M. J. Trzeciak. *First Nuclear and Engineering Science Congress*, v. 1, 1957, p. 168-169.

Recent solubility data were used to prepare diagrams based on terminal solubilities and solubilities at 1 atm. hydrogen pressure. (M24b, U, H)

2-M. Investigation of Nitride Precipitates in Pure Iron and Mild Steels. G. R. Booker, J. Norbury and A. L. Sutton. *Iron and Steel Institute, Journal*, v. 187, Nov. 1957, p. 205-215.

Iron nitride precipitates present in openhearth steel slabs, in a range of nitrided steels, and in nitrided pure iron have been isolated by an extraction replica method, and have been examined by electron microscopy, electron diffraction and X-ray diffraction. Two types of precipitate have been observed and their platelike nature demonstrated. 20 ref. (M26r; Fe-a, CN)

3-M. Metallographic Examination of Glassed Titanium Specimens. M. L. Picklesimer. *U. S. Atomic Energy Commission*, CF-56-5-141, May 18, 1956, 7 p. (CMA)

The firing temperature was within the temperature range of the alpha + beta field of the metal, causing the formation of beta-phase on cooling to room temperature or decomposition to an alloy-rich alpha-phase. Some reaction between the glass and the metal surface probably occurred, but apparently was not serious or detrimental. (M27, N6p; Ti)

4-M. (English.) **Investigation on the Titanium-Iron-Carbon System.** Yotaro Murakami, Hirozo Kimura and Yoshio Nishimura. *Kyoto University, Faculty of Engineering, Memoirs*, v. 19, July 1957, p. 302-319. (CMA)

Solid solubility ranges of TiFe and $TiFe_2$ in the Ti-Fe system are 52-54% Fe at 1080° C. and 69-77% Fe at 1200° C. In the Ti-Fe-C system there occur α-Ti, β-Ti, graphite, δ-phase, TiFe, $TiFe_2$, α-Fe and δ-Fe. Crystal structure, lattice parameters and liquidus surface. 13 ref. (M24c; Ti, Fe, C)

5-M. (Russian.) **Phase Transformations in the System Iron-Chromium-Vanadium.** I. I. Kornilov and N. M. Matveeva. *Zhural Neorganicheskoi Khimii*, v. 2, Feb. 1957, p. 355-366. (CMA)

High-temperature quenched alloys, which are ternary ferrite-containing solid solutions, transform on annealing into brittle, nonferromagnetic alloys containing sigma phase. The temperature of the alpha-sigma transformation rises continuously from 868° C. (FeCr) to 1225° C. (FeV). This points to the existence of a continuous series of solid solutions involving the two compounds. 9 ref. (M24c; Fe, Cr, V)

6-M. (Russian.) **Study of Alloys of the System Iron-Chromium-Nickel-Tungsten-Titanium-Aluminum.** V. S. Mikheev. *Zhural Neorganicheskoi Khimii*, v. 1, Sept. 1957, p. 2110-2117. (CMA)

The six-component diagram was examined in cross sections passing through the point 1.5% Ti and various points between the limits 20-50% Ni and 1.5-8% Al. Effect of changes in Ni and Al content on properties of these alloys, mainly in the region of austenitic solid solutions. 14 ref. (M24d; Fe, Cr, Ni, W, Ti; Al)

7-M. (German.) **Surface of Zinc After Various Treatments.** K. Huber and D.

Laske. *Metalloberfläche,* v. 11, July 1957, p. 217-225.

Coatings on Zn as formed in air, water or solutions examined with electron microscopic and diffractographic methods. Both reflected and penetrating beams are utilized after proper preparation of specimens. The coatings are found to be zinc oxides with variable structures depending on the treatment and on whether the specimen was prepared from the inside or outside of the coating. 5 ref. (M26r, R1h; Zn)

8-M. (German.) **Examination of Surface by Electron Emission Microscopy.** E. B. Bas. *Planseeberichte für Pulvermetallurgie,* v. 5, Aug. 1957, p. 42-52.

Principle of the emission microscope, the obtainable resolution and interpretation of photographs; preparation of specimens; molybdenum carbide used as example for the various applications of the instrument. (M21e, 1-53)

9-M. (Japanese.) **Microscopic Study of Etched Germanium Surfaces. Pt. 2.** M. Kikuchi and S. Iizima. *Electrochemical Laboratory, Bulletin (Denki Shikenjo Iho),* v. 21, July 1957, p. 481-482, + plates.

Etch pits produced by various etchants; discussion of dislocations, small angle grain boundary. (M20q, M21c; Ge, 14-61)

10-M. (Polish.) **Brittleness of Transformer Steel Plate.** F. Khol. *Hutnik,* v. 24, July-Aug. 1957, p. 295-299.

Investigation of plate structure using electron microscope; characteristics of inclusion formation on the grain border causing brittleness. (M27f, Q26s; SGA-r, AY)

11-M. (Russian.) **Electron-Microscope Investigation of the Structure of IKh18N9 Steel After Various Heat Treatments.** E. I. Kvashnina. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 35-38.

Structure changes connected with mechanical properties resulting from various heat treatments. (M27, 2-64, Q general; AY)

12-M.* Metallography of Powder-Powered Fastenings in Mild Steel. C. J. Osborn and N. E. Ryan. *Australian Institute of Metals, Journal,* v. 2, Aug. 1957, p. 48-53.

Metallographic study of microstructures occurring at interface between mild steel plate and carbon steel fasteners driven into place by explosive charge. 7 ref. (M27f; CN, 7-53)

13-M.* Study of the Deformed Layer Produced on Metal Surfaces by Mechanical Machining, Abrasion and Polishing Operations. L. E. Samuels. *Electroplating and Metal Finishing,* v. 10, Sept. 1957, p. 279-282, 285.

Metallographic structures and depth of deformed surface layers produced in specimens of 70:30 brass, austenitic steel and Zn by various metallographic machining, abrasion and polishing treatments. Methods of producing strain-free surfaces by electrolytic or mechanical polishing. (To be concluded.) (M27, M20p, K17)

14-M.* Some Metallographic Observations on the Fatigue Behaviour of Copper and Nickel and Certain of Their Alloys. C. A. Stubbington and P. J. E. Forsyth. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 90-94.

Formation of local soft spots in specimens subjected to cyclic stress. Extension phenomenon has been observed in electrolytic Cu fatigued in the annealed condition at room temperature and in stable solid solutions and pure metals cold worked before cyclic stress. Monel fatigued in the annealed condition at 300° C. reveals a difference in etching characteristics between regions exhibiting slip-band extrusion and the matrix. 6 ref. (M27, M26s, Q7; Cu, Ni)

15-M.* Aluminium-Rich Alloys of the Quaternary System Aluminium-Iron-Copper-Nickel. G. V. Raynor and B. J. Ward. *Institute of Metals, Journal,* v. 86, Nov. 1957, p. 135-144.

The constitution of the Al-rich alloys of the quaternary Al-Fe, Cu, Ni system in the solid state at 530° C. examined by metallographic, X-ray diffraction and electrode-potential measurements. Results in relation to the more recent suggestions with regard to the general nature of Al-rich intermetallic compounds formed by Al and transition metals of the first long period of the periodic table. 20 ref. (M24d; Al, *Fe, Cu, Ni*)

16-M.* Extraction of Minor Phases From Austenitic Steel. J. F. Brown, W. D. Clark and A. Parker. *Metallurgia,* v. 56, Nov. 1957, p. 215-223.

Electrolytic solution has been used as a means of concentrating minor

phases in complex alloys. Results on a variety of austenitic steels extracted with six electrolytes. A series of 18-8-Ti and 18-8-Cb steels was examined to find the effect of heating at 500-900° C. for up to 500 hr. on the phases present. Chromium carbide is found in all these steels but with longer times of heating is replaced by sigma. 13 ref. (M20q, 2-62; SS; *Ti, Cb*)

17-M. Electron Microscopy of Tin Whiskers Using Carbon Replicas. D. E. Bradley, J. Franks and P. E. Rush. *Physical Society Proceedings,* Section B, v. 70, Sept. 1, 1957, p. 889-892.

Study of shape and surface structure revealed cylindrical whiskers, coarsely ridged types, ribbon formations and numerous more complex shapes. No straightforward hexagonal or cubic rods were found. 5 ref. (M21e; Sn, 14-61)

18-M.* Crystal Structure Changes in the Tau Phase of Aluminum-Copper-Nickel Alloys. S. S. Lu and T. Chang. *Scientica Sinica,* v. 6, June 1957, p. 431-462.

X-ray investigation of ternary phase tau. Systematic structure changes are found in single phase field of tau, which occupies extensive area in isothermal section of phase diagram at room temperature. There are eight types of structures, all derived from a basic rhombohedron with corners occupied by Al atoms and centers either occupied by the heavy atoms or remaining vacant. Change of structure types follows closely Ni or Cu content for alloys of constant Al content, atomic size factor appearing to be unimportant in formation of these alloys. For alloy phase of defect lattice type, most fundamental factor controlling formation of structures is average number of valency electrons per basic structural unit. Average number of valency electrons remains remarkably constant throughout entire phase field, while electron composition varies with composition. 13 ref. (M26; Al, Cu, Ni)

19-M. Titanium-Germanium System From 0 to 30% Germanium. V. C. Petersen and R. W. Huber. *U. S. Bureau of Mines, Report of Investigations* 5365, Oct. 1957, 20 p. (CMA)

(M24b; Ti, Ge)

20-M.* A New Nickel-Boron Phase Diagram for Brazing-Alloy Development. G. S. Hoppin, III. *Welding Journal,* v. 36, Dec. 1957, p. 528s-530s.

New determination of the phase relationships in the Ni-rich end of the system. A partial phase diagram is presented. The eutectic temperature was found to be 1980° F., or 100° F. lower than the value previously known. A small region of solid solubility of B in Ni was also found. Development and application of Ni-base high-temperature brazing alloys containing B. (M24b; SGA-f, Ni, *B*)

21-M.* (French.) Charging of Iron in Cathodic Hydrogen in Presence of Sodium Sulphide. Simone Besnard, Riccardo Santini and Jean Talbot. *Comptes Rendus,* v. 245, Sept. 9, 1957, p. 965-966.

Micrographic study of electrolytic Fe showed that in addition to appearance of bubbles distributed uniformly over the metal during charging in absence of SNa_2, there also occurs a more or less continuous widening of grain boundaries, which affects mechanical properties of Fe. These effects can be corrected by annealing at 850° C. in pure, dry hydrogen, as a result of which grain boundaries regain normal appearance but bubbles remain. Boundary phenomenon is probably due to introduction of sulphur into metal during charging. 3 ref. (M27f, C23p; Fe)

22-M. (German.) Contribution to the Knowledge of the System Titanium-Gallium. Kurt Anderko and Ulrich Zwicker. *Naturwissenschaften,* v. 44, no. 19, 1957, p. 510. (CMA)

5 ref. (M24f; Ti, Ga)

23-M. (German.) Note on Titanium Hydride Formed by the Reaction of Titanium With Acids. S. Yamaguchi and R. Otsuka. *Zeitschrift fuer anorganische und allgemeine Chemie,* v. 291, Sept. 1957, p. 131-133. (CMA)

(M26r, R6b; Ti)

24-M. (German.) Electron Emission Microscopic Study of the Carburization of Molybdenum From a Gaseous Phase. E. B. Bas, Willfried Epprecht and Lucien Preuss. *Zeitschrift fuer Metallkunde,* v. 48, Sept. 1957, p. 516-522.

5 ref. (M21g, J28g, N1; Mo)

25-M. (Japanese.) Phase Diagram of FeO-TiO_2 and Fe_2O_3-TiO_2 System. Tesura Yoshida and Takeshi Takei. *Electrochemical Society of Japan, Journal,* v. 25, Aug. 1957, p. 423-427. (CMA)

The two Fe oxide-titania systems were studied to throw some light on the nature of titaniferous sands. 5 ref. (M24d; Fe, Ti, O)

26-M. (Japanese.) On the Corrosion Resistance of Titanium Alloys. Pt. 2. The Equilibrium Diagram of the Titanium-Platinum System. Hideo Nishimura and Tsuyoshi Hiramatsu. *Japan Institute of Metals, Journal,* v. 21, July 1957, p. 469-473. (CMA)

(M24, R general; Ti, Pt)

27-M. (Japanese.) Cored Structure of Magnesium-Zirconium Alloy. Shotaro Morozumi and Tomoyuki Takeuchi. *Light Metals,* v. 7, July 1957, p. 75-78.

Annealed structures and mechanism of formation of cored structures. 7 ref. (M27, M26q; Mg, Zr)

28-M. (Russian.) Interaction Between Titanium Carbide and Metals of the Iron Family. V. N. Eremenko. *Zhurnal Neorganicheskoi Khimii,* v. 1, Sept. 1956, p. 2131-2148. (CMA)

Phase diagrams of the systems Ni-TiC, Co-TiC and Fe-TiC. 38 ref. (M24c; Ti, Ni, Co, Fe, C)

29-M. (Russian.) Study of Solubility of Titanium and of the Phase Composition of Alloys in the Five-Component System Nickel - Chromium-Tungsten-Aluminum-Titanium. I. I. Kornilov, A. Ya. Snetkov and F. M. Titov. *Zhurnal Neorganicheskoi Khimii,* v. 2, Jan. 1957, p. 160-166. (CMA)

14 ref. (M24d; Ti, Ni, Cr, W, Al)

30-M. (Russian.) Non - Isomorphic Structures in Iron Alloys Containing Molybdenum and Tungsten. D. F. Zhirnov, N. F. Lashko and K. P. Sorokina. *Zhurnal Neorganischeskoi Khimii,* v. 1, Nov. 1957, p. 2588-2589. (CMA)

(M26; Fe, Mo, W, *Ni, Cr*)

31-M.* Evidence From Moiré Patterns of Packing Faults in Boron Nitride Crystals. J. F. Goodman. *Nature,* v. 180, Aug. 31, 1957, p. 425-427.

Fringe formations observed by electron microscope. 4 ref. (M26r, M21e; B, N)

32-M. Macroscopic Examination of Zircaloy-3A and Zircaloy-2 Primary Extrusion Billet Materials. R. F. Lupi. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-RFL-8, May 3, 1957, 12 p. (CMA)

(M28k; Zr, 4-55, 4-60)

33-M. Dilatometric Investigation of Zirconium, Zirconium-Uranium, Zirconium-Oxygen and Zirconium-Nitrogen Alloys. R. K. McGeary. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-36, July 17, 1957, 26 p. (CMA)

7 ref. (M24b; Zr, U, N, O)

34-M. Isothermal Sections in the Systems Molybdenum-Tungsten-Carbon and Molybdenum-Titanium-Carbon. H. J. Albert. Massachusetts Institute of Technology, Technical Report No. 5, under Contract N5ori-07817. *U. S. Office of Technical Services,* PB 124159, June 1955, 13 p. (CMA)

(M24c; Mo, W, Ti, C)

35-M. (English.) Spiral Patterns Observed on Surfaces of Aluminum Crystals. Seiichi Karashima. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 14, 1957, p. 80-90.

It is concluded that these spiral figures represent growth patterns of Al oxide deposited on specimen surface during polishing. 7 ref. (M26n;Al)

36-M.* (English.) Subgrains in Cold Worked Aluminum. H. Fumita and Zenji Nishiyama. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 14, 1957, p. 91-105.

Mechanism of formation, size and shape of subgrains and characteristics of slip bands in heavily worked specimens of Al. 28 ref. (M27c, Q24a; Al)

37-M. (French.) Nitrocellulose Replica of a Type of Anisotrope of Metallic Surfaces. Pierre A. Jacquet and Georges Chaudron. *Comptes Rendus,* v. 245, Sept. 30, 1957, p. 1129-1132.

Behavior of polarized light on surfaces of anodic-oxidized Al and its alloys, and of anodic treated 18-8 steel. Important applications in the field of nondestructive metallography. 8 ref. (M21g; Al, ST, 8-73)

38-M. (German.) Relation Between Normal Martensite and Non-Needle Martensite Textures in Fe-Mn-C Alloys. A. Masin, V. Havel and J. Tlusta. *l'Academie Polonaise des Sciences, Bulletin,* v. 5, no. 3, 1957, p. 181-184.

(M27d, N8p; AY, *Mn*)

39-M. (German.) Influence of Structure Upon the Machinability of Construction Steels. W. Knorr. *Schweizer Archiv,* v. 23, Aug. 1957, p. 258-266.

11 ref. (M27, G17k; ST)

40-M.* Observation of Dislocation Sites in Iron. F. W. C. Boswell. *Metal Progress,* v. 72, Dec. 1957, p. 92-93.

Etch pits are useful in studying the arrangement and motions of dislocations in crystals.
(M26b, M20; Fe)

41-M. (English.) Orientation Studies of Cubic Crystal Plates by the Light-Figure Method. Mikio Yamamoto and Jiro Watanabe. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 395-409.

Orientations of single crystal strips of pure iron and silicon iron can be determined with an accuracy well within ±0.5°. 8 ref.
(M26c, M23c; Fe, Si, 14-61)

42-M. (English.) Orientation Studies of Crystal Grains by Light Figures. Mikio Yamamoto and Jiro Watanabe. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 410-418.

This technique, accurate within ±1°, can be applied to crystal grains with areas as small as 1 sq. mm. and can also be used to determine orientations of single crystals of any shape. 5 ref. (M26c, M23c; 14-61)

43-M. (Italian.) On the Surface State of Zinc Monocrystals. Bruna Rivolta. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 19, No. 1, 1957, p. 280-285.

Electron diffraction study of surface of Zn monocrystals on (00.1) and (11.0) planes after electrolytic polishing. Different methods of polishing; appearance of planes studied.
(M20p; Zn, 14-61)

44-M. (Russian.) Phase Analysis of Chromium-Nickel-Titanium Steel Containing Intermetallic Phase. N. I. Blok, N. F. Lashko, K. P. Sorokina and F. F. Khimushin. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 901-903.

(M24d, M22g; ST. *Cr, Ni, Ti*)

45-M. (Russian.) Phase Analysis of Ferro-Nickel-Titanium Alloys. M. M. Shapiro and G. E. Levit-Gurevich. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 904-905.

(M24c; ST, *Ni, Ti*)

46-M. (Russian.) Austenitometer With Alternating Magnetic Fields. M. A. Kotkis. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 970-973.

Apparatus for measurement of any residual austenite in high-speed cutting tools. 6 ref.
(M23a, 1-53, N8n; TS)

47-M.* Phase Equilibrium Relationships at Liquidus Temperatures in the System FeO-Fe_2O_3-Al_2O_3-SiO_2. Arnulf Muan. *American Ceramic Society, Journal,* v. 40, Dec. 1, 1957, p. 420-431.

The volume located between the 1 and 0.2 atm. O_2 isobaric surfaces of tetrahedron representing this system was studied in detail. Scattered data were obtained at lower O_2 pressures. Results obtained in the present investigation were combined with data in the literature to construct a phase equilibrium diagram at liquidus temperatures. 14 ref.
(M24d; Fe, Al, Si, 14-68)

48-M. Danger of Over-Development in Hypereutectic Aluminum-Silicon Alloys. *Light Metals,* v. 20, Dec. 1957, p. 387-388. (From *Zeitschrift für Metallkunde,* v. 46, Aug. 1955, p. 574-578.)

Previously abstracted from original. See item 330-M, 1955.
(M26, N12; Al, *Si*)

49-M. Study of Bond Forces in Solid Solutions of Iron and Molybdenum From the Fine Structure of X-Ray Absorption Spectra. V. A. Trapeznikov and S. A. Nemnonov. *Fizika Metallov i Metallovedenie,* v. 3, no. 2, 1956, p. 314-320. (Henry Brutcher Translation no. 4009, Altadena, Calif.)

Investigation of ratio of the amplitudes of the far and near fluctuations in the fine structure at the K absorption limit for Fe, Ni, Co and Fe-Mo (0 to 4% Mo) alloys at various temperatures.
(M21f, M27b; Fe, Mo)

50-M. (Norwegian.) Dislocations in Solids. Alf Taraldsen. *Teknisk Ukeblad,* v. 104, Oct. 17, 1957, p. 847-853.

Proofs of existence of dislocations, their influence on the strength of metallic materials and on the methods of materials testing. 8 ref.
(M26b, Q27a)

51-M. (Russian.) Nature of the Carbide Phases of White Iron. F. K. Tkachenko and V. F. Zubarev. *Liteinoe Proizvodstvo,* no. 11, Nov. 1957, p. 20-21.

Compares results obtained through use of magnetometer, X-rays and other methods. (M26r, M23; CI-p)

52-M.* Some Effects of Heterogeneous Structures in Lead Pipes. J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 161-163.

Experiments indicate that lead pipes with hetergeneous (zoned)

grain structures have a lower resistance to fatigue than either uniformly fine or uniformly coarse-grained pipes. A method is suggested for preventing the formation of heterogeneous structures by controlled deformation and recrystallization. The method might also be used to control grain-size independently of extrusion conditions. 6 ref. (M27c, N5; Pb, 4-60)

53-M.* Plutonium-Iron System. P. G. Mardon, H. R. Haines, J. H. Pearce and M. B. Waldron. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 166-171.

Equilibrium diagram for Pu-Fe alloys. Results verify existence of the compounds Pu_6Fe and $PuFe_2$; low-melting-point eutectic between delta-Pu and Pu_6Fe; and a high-melting-point eutectic between $PuFe_2$ and gamma-Fe. 11 ref. (M24b; Pu, Fe)

54-M.* Preliminary Investigation of the Plutonium-Thorium System. D. M. Poole, G. K. Williamson and J. A. C. Marples. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 172-176.

X-ray, metallographic, thermal-analysis and dilatometric studies used to investigate the Pu-Th phase diagram. Plutonium dissolves extensively in alpha-Th, the maximum solubility being 48.5 at. % at 615° C. The large solubility of Pu in alpha-Th is possibly associated with a considerable increase in the apparent atomic radius of the Pu atom; this large radius corresponds to a valency of 4 on Zachariasen's scheme, equal to that of Th; this, it is suggested, accounts for the wide stability range of the solution. 4 ref. (M24b; Pu, Th)

55-M.* Aluminium-Rich Intermetallic-Compound Phases in the System Aluminium-Iron-Cobalt-Copper. G. V. Raynor and B. J. Ward. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 182-184.

Metallographic and X-ray methods, together with the chemical analysis of primary crystals extracted from slowly cooled alloys, show that the phases T(CoCu) and T(FeCu) form a complete series of solid solutions in the quaternary system Al-Fe-Co-Cu. (M24d; Al, Fe, Co, Cu)

56-M.* Lattice Spacings and Melting Points in the Thorium-Cerium System. R. T. Weiner, W. E. Freeth and G. V. Raynor. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 185-188.

The Th-Ce system studied by X-ray and micrographic methods. The system shows complete solid solution over the whole composition range at room temperature. The alloys are face-centered cubic, and an anomalous decrease in the lattice spacing of the Th-rich alloys with increasing Ce content is observed. It is suggested that this anomaly is caused by the transition of an electron normally in a 4f ionic state in Ce to a 5d bonding state. 13 ref. (M26, P12n; Th, Ce)

57-M.* Constitution of Magnesium-Rich Magnesium - Aluminium - Calcium Alloys. J. A. Catterall and R. J. Pleasance. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 189-192.

Isothermal sections at 450, 370 and 290° C. of the Mg-Al-Ca system have been constructed at compositions up to 6 wt. % Al and 1.6 wt. % Ca. The phases appearing in this range are alpha (Mg), Mg_2Ca, Al_2Ca, and $Mg_{17}Al_{12}$. (M24c; Mg, Al, Ca)

58-M. (Russian.) **About Surplus Vacancies Appearing in Brass Upon Evaporation of Zinc.** Ya. E. Geguzin and N. N. Ovcharenko. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 400-406.

7 ref. (M26s; Cu, Zn)

59-M.* (Russian.) **Study of Dependence of Bond Forces on State of Crystals in Metals and Solid Solutions.** V. A. Ilina, V. K. Kirtskaya, G. V. Kurdyumov, Yu. A. Osipyan and T. I. Stelletskaya. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 417-431.

Investigation of heat treatment and plastic deformation upon bond forces in crystals of solid solutions: Fe-Cr, Fe-W, Fe-Mn, Fe-Ti and in metals: Cr, Ta and W. Change of the value of bond forces in crystals is the result of regrouping of the atoms in the crystal lattice on heat treatment and plastic deformation. 24 ref. (M25, M26, 2-64, 3-68)

60-M. (Russian.) **Influence of Crystalline Lattice Static Flaws Upon Mechanical Properties of Alloys.** V. A. Pavlov. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 432-438.

Mechanical properties of Fe-C and Al-Mg alloys in respect to deformation of crystalline lattice of the main component. 29 ref. (M26, Q general; Fe, Al, Mg)

61-M. (Russian.) **Influence of Induction Heating Parameters Upon Grain Size of Austenite in Nickel Steel.** I. N.

Kidin. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 36-42.
(M27c, 2-64; AY, *Ni*)

62-M. (Russian.) Development of High-Temperature Metallography. M. G. Lozinski. *Metallovedenie i Obrabotka Metallov,* no. 11, Nov. 1957, p. 18-42.

Methods and instruments in study of microstructure of heated metals and study of properties of metals at different temperatures. 23 ref.
(M27, 2-62, P general, Q general)

63-M.* Interpretation of Roll Textures of Face-Centered Cubic Metals. E. R. W. Jones and E. A. Fell. *Acta Metallurgica,* v. 5, Dec. 1957, p. 689-671.

Evidence from two different approaches is shown from which it is concluded that a mixture (110) [112] and (112) [111] textures describes the roll texture of f.c.c. metals better than (123) [412]. 7 ref. (M26c)

64-M.* Additional Modes of Deformation Twinning in Magnesium. R. E. Reed-Hill and W. D. Robertson. *Acta Metallurgica,* v. 5, Dec. 1957, p. 717-727.

Evidence is presented for the existence of two additional modes of deformation twinning, (3034) and (1013), produced by tensile stress parallel to the basal plane in Mg single crystals. The crystallographic mechanism of formation of (3034) twins is discussed in detail because fracture occurs by a parting mechanism in this twin. The temperature dependence of both modes of twinning, in the range of −190-286° C., is unusual in that they are formed most readily at higher temperatures. 14 ref.
(M26c, Q24b, 2-60; Mg, 14-61)

65-M.* Density of Dislocations in Compressed Copper. L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Acta Metallurgica,* v. 5, Dec. 1957, p. 738-740.

Changes in energy, macroscopic density and electrical resistivity associated with the annealing of deformed Cu have been measured. Three independent estimates of the density of dislocations in the deformed material are obtained by combining these results with the best available theoretical values for the energy, density and resistivity changes associated with dislocations. 11 ref.
(M26b, P15g, J23; Cu, 14-61)

66-M.* Thermodynamic Properties of Silver-Gold Alloys. J. L. White, R. L. Orr and R. Hultgren. *Acta Metallurgica,* v. 5, Dec. 1957, p. 747-760.

Correlating functions have been developed for the purpose of evaluating thermodynamic data on binary alloy systems, and these functions have been applied to the extensive published data on the Ag-Au system. 34 ref. (M24b, P12; Ag, Au)

67-M. Isopiestic Techniques Applied to Phase Diagram Determination in the Systems Silver-Cadmium and Copper-Cadmium. H. W. Rayson and W. A. Alexander. *Canadian Journal of Chemistry,* v. 35, Dec. 1957, p. 1571-1575.

Two methods of determining phase boundaries and solubilities of binary systems in which volatility of one component is negligible compared with the other. 9 ref.
(M24b; Ag, Cd, Cu)

68-M. Lattice Constants of Separated Lithium Isotopes. E. J. Covington and D. J. Montgomery. *Journal of Chemical Physics,* v. 27, Nov. 1957, p. 1030-1032.

6 ref. (M26, 14-63; Li)

69-M.* Investigation of the Nickel-Rich Portion of the System Ni-Zr. Emma Smith and R. W. Guard. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1189-1190. (CMA)

Alloys containing up to 60 at. % Zr were made in a study of the Ni-rich end of the Ni-Zr system. Procedures are described. The solid solubility of Zr in Ni is less than 1 at. %, and microstructures are essentially single phase. Compounds have been identified tentatively as Ni_5Zr, Ni_7Zr_2, Ni_5Zr_2, Ni_5Zr_4 and NiZr. Ni_5Zr is face-centered cubic with $a = 6.71$ Å, and is isomorphous with Ni_5U and Cu_5U. Other structures appear complex. 4 ref.
(M24b; Ni, Zr)

70-M.* Cross-Rolling and Annealing Textures in High-Purity Iron. Hsun Hu. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1164-1168.

X-ray Geiger counter spectrometer used for determination of texture following deformation and annealing of cross-rolled high-purity iron. Deformation texture predominantly (100), [011] plus minor texture components of (111), [110] or (111) or [112] in partially recrys-

tallized specimen; minor deformation texture components were replaced by new orientation while major deformation texture was retained. Texture developed after complete recrystallization could be described as rotations around each of the (110) poles of minor textured components. 12 ref.
(M26c, N5; Fe-a)

71-M.* Preparation and Diffraction Data of Ba-Al Alloys. Dilip K. Das and Douglas T. Pitman. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1175.

Arrangement for preparation of $BaAl_4$ and X-ray diffraction data for powdered $BaAl_4$.
(M22g; Ba, Al)

72-M.* Stability of AISI Alloy Steels. A. B. Wilder, E. F. Ketterer and D. B. Collyer. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1176-1181.

Changes in microstructure observed in typical AISI constructural alloy steels in welded and unwelded conditions after exposure for 34,000 hr. at 900, 1050 and 1200° F. Tensile and creep-rupture properties after exposure for 10,000 hr. 9 ref.
(M27d, Q27a, Q3m, 2-62; AY)

73-M. (German.) **Systems Zirconium-Sulphur and Structure of Some Compounds.** Harry Hahn, Berhnard Harder, Ursula Mutschke and Peter Ness. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 292, Nov. 1957, p. 82-96.

X-ray examination established existence, in addition to already known compounds ZrS_3 and ZrS_2, of compounds ZrS and Zr_4S_3 and of phases Zr_3S_4. 13 ref.
(M24b, M26r, Zr, *S*)

74-M.* Investigation of Grain Boundary Phase in Stainless Steel. C. C. Clark, J. R. Mihalisin and K. G. Carroll. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1210-1211.

Electron micrographs, electron diffraction data in chemical analysis used for exploring grain-boundary precipitate thought to be responsible for anomalous behavior of particular heat of Type 310 stainless steel. Possible relationship of precipitate to iron boro-carbide and chromium carbide. (M27f; SS)

75-M.* The Uranium-Silicon Epsilon Phase. S. Isserow. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1236-1239.

Investigation of composition, corrosion resistance, physical and mechanical properties and extrusion constant of epsilon alloy of U- Si. Corrosion resistance depended upon absence of phases other than epsilon. Epsilon phase has Si content in the range of 3.9 to 4%. 5 ref.
(M26q, R general; U, *Si*)

76-M.* CsCl-Type Ordered Structures in Binary Alloys or Transition Elements. T. V. Philip and Paul A. Beck. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1269-1271. (CMA)

Among the binary alloys studied for CsCl-type structures were V-Fe, Ti-Fe, Ti-Co, Ti-Ni and Ti-Re. The Ti-Re alloys are found to have a body-centered cubic structure. Bond strengths decrease when V is substituted for Ti, which has a strong tendency to form CsCl-type structures. The bond strength increases from TiNi to TiCo to TiFe. 8 ref.
(M26; 2-60; Ti)

77-M. Cylindrical Carbide Particles. J. H. Westbrook. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1277.

Notes on the structure of cylindrical carbide particles formed in chromium carbide alloys containing 3.2% C. Phases present alloy identified as alpha Cr and $Cr_{23}C_6$.
(M27, 14-68; ST)

78-M. Distribution of Boron in Gamma Iron Grains. R. M. Goldhoff and J. W. Spretnak. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1278-1283.

Distribution of B in gamma Fe grain as a function of temperature by means of three experimental techniques including grain growth in high-purity FeC and FeC-B alloys. X-ray diffraction measurements of lattice parameters of FeB alloys as function of temperature and metallographic tests for B in grain boundaries. Boron undergoes adsorption to gamma Fe grain boundaries and temperature coefficient of adsorption is positive. 27 ref.
(M25m; Fe, B)

79-M. Crystallographic Angles for Manganese Bismuthide. W. J. Romanow. *Journal of Metals*, v. 9, *AIME Transactions*, v. 209, Oct. 1957, p. 1284.

Note giving table of angles between crystallographic plane of man-

ganese bismuthide. 7 ref.
(M26q; Mn, Bi)

80-M. Recent European Advances in Optical Metallography. Roland Mitsche. *Metal Progress,* v. 73, Jan. 1958, p. 97-101.

Modern microscopes are designed to avoid fatigue of the operator, with automatic timing, continuous focusing and multiple light sources. Attachments exist for hardness tests and visual observations, in vacuum or controlled atmospheres, at temperatures from −325 to +2700° F.
(M20, M21, M23, 1-53)

81-M. Annealing of Electron Bombardment Damage in Silicon Crystals. G. Bemski and W. M. Augustyniak. *Physical Review,* v. 108, Nov. 1, 1957, p. 646-648.

Experiments with displacement of stationary nuclei from their normal lattice positions and kinds of damage caused thereby. 12 ref.
(M25, 2-66; Si)

82-M. Growth of Oxide Whiskers on Metals at High Temperatures. Riitsu Takagi. *Physical Society of Japan, Journal,* v. 12, Nov. 1957, p. 1212-1218.

Use of electron microscopy and diffraction in studying specimen from uniformly oxidized wire. 10 ref. (M21h, M22h, M26r; Fe)

83-M.* The Metallographic View. Pt. 39. The Martensitic Stainless Types. Howard E. Boyer. *Steel Processing and Conversion,* v. 43, Oct. 1957, p. 568-569.

Microstructures of air-cooled and tempered Types 440-C, 416 and 410 martensitic stainless steels, chemical composition and hardness values.
(M27, Q29n; SS)

84-M. The Metallographic View. Pt. 50. Ferritic and Austenitic Stainless Types. Howard E. Boyer. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 625, 646.

Microstructure and hardness of Types 430 and 321 stainless steels in annealed conditions, and Type 302 following cold working.
(M27, Q29n; SS)

85-M. (French.) Metallography of Low-Carbon Steels. L. Habraken and T. Greday. *Revue de Mines,* v. 13, 1957, p. 683-692.

Study of martensitic and bainitic transformations. Relationship between mechanical and physical properties and microstructures was observed by electron microscopy.
(M21e, N8, P general; Q general; Cn-g)

86-M. (German.) Structure and Transformation Behavior of Very Quickly Solidified Mg-Treated Cast Iron. Roland Mitsche. *Berg-und Hüttenmännische Monatshefte,* v. 102, July-Aug. 1957, p. 204-213.

13 ref. (M27, N8q, E25n; CI, *Mg*)

87-M. (Russian.) Achievements and Trends in Development of Soviet Metallography. M. L. Bernshtein, M. E. Blanter and M. L. Lozinskii. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1202-1211.

5 ref. (M general)

88-M. (Russian.) Electron Microscopy in the Soviet Union. R. Ya. Berlaga, V. N. Vertsner and A. A. Lebedev. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1214-1219.
(M21f)

89-M.* Observation of Dislocations in Silicon. W. C. Dash. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 57-68.

A technique has been developed to decorate dislocations in Si so they are visually observable with an infrared image tube in conjunction with a microscope. Silicon single crystals were grown by drawing from the melt contained in a quartz crucible. These were then etched during a period of several hours or overnight in a mixture of nitric, hydrofluoric, and acetic acids to produce deep pits at the points of emergence of the dislocations.
(M26b, M20q; Si)

90-M.* Direct Observations of the Arrangement and Motion of Dislocations in Aluminum. P. B. Hirsch, R. W. Horne and M. J. Whelan. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 92-115.

It has been possible to observe directly dislocations in Al by transmission electron microscopy using a high resolution electron microscope. Most of the specimens examined so far were prepared by heating 99.99 + % Al and 99.8% Al at room temperature, followed by etching in dilute HF. 13 ref.
(M26b, M21e; Al)

91-M.* Thermal Etching of Dislocations in Silver. E. S. Machlin. Paper from "Dislocations and Mechan-

ical Properties of Crystals". John Wiley & Sons, Inc., p. 164-171.

Dislocations in Ag may be revealed by a thermal etch technique. It is believed pits are formed at the points of emergence of dislocations as a result of the equilibration of the dislocation line tension and the surface tension. In this technique, electropolished Ag is immersed in a dynamic flow of A containing 10 mole % of oxygen at 600° C. for 5 to 10 min. and then cooled to room temperature in purified A. (M26b, M20q; Ag)

92-M.* Thermal Etching of Dislocations. Hideji Suzuki. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 172-175.

Thermal etching technique can be applied to most metals and alloys, except for some metals having high vapor pressure at high temperature, such as Zn, Cd, Mg and their alloys. Some examples of Fe-Ni alloys which were oxidized at 1100° C. for 30 min. are shown. (M26b, M20q)

93-M.* Mechanism of Glide and Work Hardening in Face-Centered Cubic and Hexagonal Close-Packed Metals. Alfred Seeger. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 243-329.

A theoretical picture is given for the dislocation processes governing the plastic properties of face-centered cubic metals and alloys and of hexagonal metals with basal glide. It is based on the similarities and dissimilarities of the dislocations in face-centered cubic and hexagonal close-packed structures and in metals and alloys with low and high stacking fault energies. It accounts for the critical shear stress of pure metals and dilute alloys, work hardening, recovery, surface markings (slip bands) and creep. 146 ref. (M26b, Q24)

94-M.* Lattice Defects in Plastically Deformed Metals. W. Boas. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 333-344.

In all metals investigated, irrespective of the heating rate and of whether deformation occurs by tension, compression or torsion, there is a rapid evolution of energy at the high-temperature end of the curve showing the release of energy. This energy release is always associated with recrystallization, as has been proved by metallographic and X-ray methods. It is accompanied by changes in hardness, density and electrical resistivity. This energy is derived from the disappearance of the dislocations created by deformation. 19 ref. (M26s, M26b, N5)

95-M.* Nature and Effect of Substructure in Polycrystalline Aluminum. C. J. Ball. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 353-358.

Subgrain size decreases with increasing deformation and approaches a limiting value which increases linearly with the temperature of deformation. The types of stress-free low-angle boundary that can be formed without climb with dislocations of one, two, or three systems have been calculated. If dislocations of only one or two systems are present, the possible rotation axes are [100], [111], and in the plane (110). (M26b, M27c; Al)

96-M.* A Comparison of Preyield Microstrain in Steel With Dislocation Theory. D. S. Wood. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 413-418.

If a stress is suddenly applied to the material and maintained constant thereafter, the initial rate of plastic straining should be proportional to the rate of release of dislocations from atmospheres. Experimental record of tensile load and preyield inelastic microstrain versus time under conditions of rapidly applied constant load. Experimental curves of microstrain versus time for several values of applied tensile stress at room temperature. For stress less than the upper yield stress (about 40,000 psi.) the microstrain asymptotically approaches some equilibrium value. (M26b, Q24h; ST)

97-M.* Theory of Whisker Dekinking. F. R. N. Nabarro. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 521-536.

Several different mechanisms for the straightening on annealing of a single crystal whisker which has been plastically kinked. Analysis shows that the only mechanism of straightening which will explain the high and roughly uniform rate of the process is that of dislocation climb by migration of vacancies or interstitial ions. The rate of evolution of vacant lattice sites from jogs in dislocations is only sufficient

to maintain this rate of climb if the edges of the dislocations are densely packed with jogs. Dislocation glide may account for the rapid initial recovery. 11 ref. (M26b, 14-61)

98-M.* Thermal Annealing of Imperfections in the Noble Metals. J. S. Koehler, J. W. Henerson and J. H. Bredt. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 587-602.

The annealing of irradiated, quenched, cold worked, and evaporated noble metals is examined. Six stages of annealing are described; the associated activation energies range from 0.1 to about 2.1 ev. An attempt is made to assign each stage of annealing to a particular atomic process. The magnitude of the resistance introduced by dislocations is considered. 36 ref. (M26s, M26b, J23, P13a; EG-c)

99-M.* (Czech.) **Plastic Deformation of Steel During Repeated Heating-Cooling Cycles and Microstructures of Metals and Alloys at High Temperatures.** M. G. Lozinskij. *Hutnické Listy,* v. 12, Nov. 1957, p. 974-985.

Selective color oxidation permits observation of differences in orientation of individual grains and peculiarities of differences in microstructure in vacuum heating. IMAS-5M apparatus developed in the U.S.S.R. permits direct microscopic observation and photography of the deformation of the heated specimens. 21 ref. (M27, 2-62, X4, X5; ST)

100-M.* (German.) **Electron Microscope Studies of the Substructure of Chemically Brightened Aluminum Surfaces.** D. Altenpohl and W. Hugi. *Aluminium,* v. 33, Dec. 1957, p. 774-781.

Grains of chemically brightened Al surfaces contain more than 1000 subgrains, mostly 0.2-4 microns. Electron micrographs made on high-purity Al showed the cast and heat treated structures, the cold rolled substructure, structures in the stress-relieved state and substructure after recrystallization. Correlation exists between the substructures and the position of the plane of observation in the crystal lattice, the purity of the Al, the cold reduction and the type of heat treatment. 11 ref. (M27, M21e; Al)

101-M. (German.) **Investigations on the Phase Diagram of Iron (II) Oxide and Managanese (II) Oxide and Its Relation to the Deoxidation of Pure Iron With Managanese.** Herman Schenck, Norbert G. Schmahl and A. K. Biswas. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 517-521.

The phase diagram of the system iron (II) oxide and manganese (II) oxide was determined by observing the melting of small cylinders in a special furnace heated by a molybdenum spiral. The liquidus and solidus curves are described with thermodynamic calculations. The latent heat of fusion was determined for both substances, and the melting point of Mn (II) oxide was found to be 1750° C. The deoxidation diagram of pure iron with Mn was determined. 25 ref. (M24c, P12, D11r; Fe, *Mn, O*)

102-M. (German.) **Electron Microscope Examination of Buffed and Ball Burnished Metal Surfaces.** M. Dreher. *Metallwaren-Industrie und Galvanotechnik,* v. 48, July, 1957, p. 284-288.

Advantages of both methods, with special attention to the development of electron microscopy. (M21e, L10b, S15d)

103-M.* (French.) **Applications of Electron Micrography to Research in the Steelmaking Field.** J. Plateau and R. Tamhankar. *Métaux Corrosion, Industries,* v. 32, Oct. 1957, p. 359-381.

Review of principal research carried out by electron microscope on intercrystalline transformations and precipitation, precipitation and intergranular phenomena, surface phenomena, mechanical properties, dust and fumes in steelmaking process; techniques of specimen preparation. 128 ref. (M21e, M20; ST)

104-M. (Russian.) **X-Ray Investigation of Intercrystalline Internal Adsorption in Silver Alloys.** V. I. Arkharov and S. D. Vangengeim. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 439-446.

Change of lattice parameter in Ag alloys in the grains of different size due to contamination with metals adsorbed on the surface of the alloy crystals. 12 ref. (M26, M21f, P13d; Ag)

105-M. (Russian.) **Crystallization of Trans-Eutectic Magnesium Gray Cast Iron.** A. V. Chernovol. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 21-22.

Chemical composition of the cast iron and micrographic investigation of the crystallization of the trans-eutectic, magnesium modified gray cast iron. 8 ref. (M27, E25n, CI, *Mg*)

106-M. (Russian.) **Nonmetallic Inclusions in Large Ingots.** A. I. Koshik and V. K. Barzii. *Stal',* v. 17, Oct. 1957, p. 943-947.

Distribution of nonmetallic inclusions in ingots of 9 and 14 tons. (M28h; 5-59, 9-69; ST)

107-M. (Russian.) **X-Ray Study of Surface Layers of Metals During Cold Working.** N. A. Petrova, M. Ya. Shashin and V. V. Latsh. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1372-1374.

5 ref. (M21f, Q24, 1-67)

108-M.* **Experiments With an Electron and Iron Projector Tube.** A. P. Komar and Iu. N. Talanin. *Academy of Sciences of the USSR, Bulletin, Physical Series,* v. 20, no. 10, p. 1029-1034. (Columbia Technical Transactions.)

Images obtained in working with an electron projector with a tungsten point under conditions of relatively "poor" vacuum with continuous evacuation of tube by oil diffusion pumps. 13 ref. (M21e, 1-53)

109-M.* **Some Effects of Heterogeneous Structures in Lead Pipes.** J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 161-163.

Experiments indicate that lead pipes with heterogeneous (zoned) grain structures have a lower resistance to fatigue than either uniformly fine or uniformly coarse-grained pipes. Method for preventing the formation of heterogeneous structures by controlled deformation and recrystallization. The method might also be used to control grain size independently of extrusion conditions. 6 ref. (M27c, N5, F24; Pb, 4-60)

110-M.* **Plutonium-Iron System.** P. G. Mardon, H. R. Haines, J. H. Pearce and M. B. Waldron. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 166-171.

Equilibrium diagram for Pu-Fe alloys. Results verify the existence of the compounds Pu_6Fe and $PuFe_2$, a low-melting-point eutectic between delta Pu and Pu_6Fe, and a high-melting-point eutectic between $PuFe_2$ and gamma iron. 11 ref. (M24b; Pu, Fe)

111-M.* **Preliminary Investigation of the Plutonium-Thorium System.** D. M. Poole, G. K. Williamson and J. A. C. Marples. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 172-176.

X-ray, metallographic, thermal-analysis and dilatometric studies. Pu dissolves extensively in alpha Th, the maximum solubility being 48.5 at. % at 615° C. The large solubility of Pu in alpha Th is possibly associated with a considerable increase in the apparent atomic radius of the Pu atom; this large radius corresponds to a valency of 4 on Zachariasen's scheme, equal to that of Th. 4 ref. (M24b; Pu, Th)

112-M.* **Aluminum-Rich Intermetallic-Compound Phases in the System Aluminium-Iron-Cobalt-Copper.** G. V. Raynor. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 182-184.

Metallographic and X-ray methods and chemical analysis of primary crystals extracted from slowly cooled alloys show that the phases T(CoCu) and T(FeCu) form a complete series of solid solutions in the quaternary system Al-Fe-Co-Cu. (M24d; Al, Fe, Co, Cu)

113-M.* **Lattice Spacings and Melting Points in the Thorium-Cerium System.** R. T. Weiner, W. E. Freeth and G. V. Raynor. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 185-188.

Thorium-cerium system studied by X-ray and micrographic methods shows complete solid solution over the whole composition range at room temperature. The alloys are face-centered cubic, and an anomalous decrease in the lattice spacing of the Th-rich alloys with increasing Ce content is observed. The solidus curve is determined up to 1550° C. A high-temperature vacuum furnace and a gravity-quenching technique were used above 1200° C. 13 ref. (M26, P12n, M24b; Th, Ce)

114-M.* **Constitution of Magnesium-Rich Magnesium-Aluminium-Calcium Alloys.** J. A. Catterall and R. J. Pleasance. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 189-192.

Isothermal sections at 450, 370 and 290° C. of the Mg-Al-Ca system have been constructed at compositions up to 6% Al and 1.6% Ca. The phases appearing in this range are alpha (Mg), Mg_2Ca, Al_2Ca, and $Mg_{17}Al_{12}$. (M24c; Mg, Al, Ca)

115-M.* **Studies on Group III-V Intermetallic Compounds.** C. Kolm, S. A. Kulin and B. L. Averbach. *Physical Review,* v. 108, Nov. 15, 1957, p. 965-971.

Properties of the compounds GaAs and InSb alloyed with Si, Ge, Sn and Pb; the quasi-binary InSb-GaSb also investigated. Lattice parameter, infrared absorption and electrical re-

sistivity measurements were made. The forbidden energy gaps of the GaAs alloys were found to vary inversely with the spacing, with the one exception of the GaAs-Ge alloy, where the reverse effect was observed. On the basis of the infrared transmission and electrical resistivity data it was concluded that the Group IV elements substituted for nearest-neighbor pairs in GaAs, but in the case of Si and Ge in InSb it appeared that the substitution of only one atom in the unit polyhedron occurred. 13 ref.
(M26q, P15g; Ga, As, In, Sb)

116-M.* Study of Freshly Deformed Metal Surfaces With the Aid of Exo-Electron Emission. L. Grunberg. *Wear,* v. 1, Oct. 1957, p. 142-154.

Review of literature dealing with emission of exo-electrons from deformed metal surfaces. Recent investigations show that surface films on deformed metals contain special electron energy levels associated with crystal imperfections in the oxide lattice. The energy levels can be excited thermally or optically leading to electron emission at definite temperatures or wave lengths of light. 19 ref.
(M23, P15k, 3-68)

117-M.* High-Speed Dilatometer Designed for Welding Research. E. C. Nelson. *Welding Journal,* v. 37, Feb. 1958, p. 57s-61s.

Design and operation of a high-speed dilatometer capable of duplicating the rapid heating rates and high temperatures encountered in the heat-affected zone of a weld. Continuous cooling transformation diagram for a low-carbon high-alloy steel. Alternative methods of presenting such data. 4 ref.
(M23b, 1-53, K9r, N8; AY)

118-M.* Structure of Atoms and Atomic Aggregates. J. Bardeen, W. Bitler and J. E. Goldman. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 22-43.

Explains basic physical concepts of wave mechanics and the development of self-consistent theory of structure of atoms, molecules and multi-atomic aggregates. 20 ref. (M25)

119-M. Crystal Imperfections. J. Bardeen. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 82-102.

Various types of imperfections in solids; wide variety of phenomena that are affected by them. 20 ref. (W25s)

120-M. The Metallic State; Theory of Some Properties of Metals and Alloys. R. Smoluchowski. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 103-127.

Metallic state described in terms of crystallography and thermodynamics of phase equilibria; electronic structures of metals and alloys. 10 ref. (M26, M25, P12)

121-M.* Electron Theory of Alloy Formation and Elastic Properties. H. Jones. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 128-141.

Fermi energy and other wave mechanic concepts relate phase formation in alloys to the atomic properties of the constituents. Brief theoretical explanation of elastic properties of metals and alloys. 6 ref. (M25, Q21)

122-M.* Dislocations in Solids. R. Smoluchowski. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 142-160.

Nature, source and movement of dislocations in metals and crystals. Application of dislocation theory in the study of basic mechanisms in plastic deformation. (M26b, Q24)

123-M.* Dislocation Theories of Mechanical Properties. H. W. Paxton. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 161-178.

Relationship of dislocation theories to yield strength as influenced by work hardening, precipitation hardening, recrystallization and purity. 25 ref. (M26b, Q23b, Q23a, N5, N7)

124-M.* Experimental Evidence for Behavior of Dislocations. Earl R. Parker. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 179-195.

Dislocation theories related to mechanism involved in work hardening in creep and in strain aging of metals. 23 ref.
(M26b, N7e, Q23a, Q3)

125-M.* (German.) **Grain-Boundary Structure and Hot Tearing in Pure Aluminum.** F. Erdmann-Jesnitzer and G. Schweigel. *Aluminium,* v. 34, Jan. 1958, p. 14-20.

Creep and long-period loading in the region of pronounced crystal recovery and hot tearing are affected by grain-boundary substance and

structure. Grain boundaries of fused 99.94% Al specimens were observed. Laue back-reflection diagrams for spatial orientation. Large-angle boundaries fuse first; small-angle boundaries melt much later. 25 ref. (M27f, Q26q, 1-67; Al-a)

126-M. (German.) **System Iron-Silicon-Antimony.** Gerhard Zwingmann and Rudolf Vogel. *Archiv für das Eisenhüttenwessen,* v. 28, Sept. 1957, p. 591-595.

Investigated by means of chemical and thermal analysis. Conditions of equilibrium represented in a series of cross-sections through the system in the high porosity area of the three components. 6 ref. (M24c; Fe, Sb, Si)

127-M. (Hungarian.) **Defects in Alpaca Alloys Caused by Phosphorus Contamination.** Zoltan Hegedüs and Mihaly Stefan. *Kohaszati Lapok,* v. 12, Nov. 1957, p. 470-472.

4 ref. (M27d, 9; Cu, Zn, Ni, *P*)

128-M. (Russian.) **Influence of Additives Upon Distribution of Sulphur in Steel.** N. S. Kreshchanovskii and S. S. Kraskovskii. *Liteinoe Proizvodstvo,* June 1957, p. 22-26.

Influence of Al, Zr, Al-Ba-Ca alloy, Ce and Ca upon sulphur distribution in high-Cr steel. (M27d, D9r, 2-60; SS, *S, Al, Zr, Al, Ba, Ca, Ce, Cr*)

129-M. (Russian.) **Distribution of Magnesium in Iron Alloys.** M. A. Krishtal and E. P. Rikman. *Liteinoe Proizvodstvo,* July 1957, p. 25-26.

Distribution of Mg in cast iron is not uniform. The highest concentration of Mg is at interface of graphite grains. 6 ref. (M27f, E25q; CI, *Mg*)

130-M. (Russian.) **Influence of Nitrogen Content Upon Structure and Mechanical Properties of Gray Iron.** B. V. Bauman. *Liteinoe Proizvodstvo,* Aug. 1957, p. 24-26.

Incorporation of N into cast iron by blowing ammonia through the metal at 1360, 1450 and 1550° C. Graphs of mechanical properties in respect to N content for alloys containing Si, Mn, Cr, V, Al and Ti. Micrographs of cast iron with various N contents. (M27d, E25q, Q general; CI, *Al, Cr, N, Mn, Si, Ti, V*)

131-M. (Russian.) **Phase States and Intercrystalline Liquation in Iron-Carbon-Silicon Alloys.** Ya. N. Malinochka, *Liteinoe Proizvodstvo,* Oct. 1957, p. 19-22.

Phase diagrams of Fe-C-Si alloys at 1165, 1325, 1135 and 1150° C. 6 ref. (M24c; Fe, C, Si)

132-M. (Book.) **Dislocations and Mechanical Properties of Crystals.** J. C. Fisher, W. G. Johnston, R. Thomson and T. Vreeland, Jr. 634 p. 1957. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $15.

Relevant papers abstracted separately. (M26b, Q24)

133-M. (Book.) **Science of Engineering Materials.** J. E. Goldman, Ed. 510 p. 1957. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $12.

Proceedings of a symposium devoted to solid state science. Section on basic structure of matter, theory of metallic state and properties of metals and alloys. Surface phenomena, magnetic properties, physics of semiconductors and aspects of noncrystalline materials. Papers abstracted separately. (M general, N general, P general, Q general)

134-M. Alloys of Silicon With Palladium and Silver. N. Kondal Rao and H. Winterhager. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 139-148.

Two new alloys and considerable alterations proposed in Pd-Si system; no solid solubility of Ag in Si; immiscibility loop in the ternary system. 7 ref. (M24b, M24c, N12p; Si, Pd, Ag)

135-M. Oxide-Replica Technique for Electron-Microscopy of Duralumin. D. L. Bhattacharya and K. S. Grewal. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 149-155.

Thicker oxide coating than usual is necessary; specimens stripped by amalgamation with mercury. 7 ref. (M20r; Al)

136-M. X-Ray Diffraction of Alpha-Brass. K. Gupta, P. Basak and G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 157-161.

Progressive dezincification in vacuum. (M22g; R2k, Cu-n)

137-M. X-Ray Diffraction Studies of Gold-Beryllium Alloys. G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 163-167.

Crystal structure and density of $AuBe_5$. (M22g, M26; Au, *Be*)

138-M. Preferred Orientations in Cold Drawn Face-Centered Cubic Metal Wires. P. Dayal. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 201-210.

Determination of fiber texture developed in wires of Cu, Ni, Al, Ag and Au drawn to 97.5% reduction in diameter. 29 ref. (M26c, M22g, Q24a; Cu, Ni, Al, Ag, Au, 4-61)

139-M.* Zonal-Texture of Drawn Face-Centered Cubic Metal Wires. P. Dayal. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 211-222.

Variation in texture of drawn wires of Cu, Ni, Al, Ag and Au from the surface to their core. Tensile strength and resistivity are affected by nonuniformity in texture across the cross-sections. New method to measure degree of orientation from surface to core. 19 ref. (M26c, Q27a, P15g, M22g; Cu, Ni, Al, Ag, Au, 4-61)

140-M. Effect of Oxygen on Etch-Pit Formation in Silicon. R. A. Logan and A. J. Peters. *Journal of Applied Physics,* v. 28, Dec. 1957, p. 1419-1423.

(M20q; Si)

141-M. (German.) **Development of Metalloid-Containing Phases in Alloys.** H. Nowotny and A. Wittman. *Radex Rundschau,* no. 5-6, 1957, p. 693-707.

X-ray investigation of metal-metalloid phases in the system UC-ZrC, UC-CbC and UC-TaC; influence of C, B, N and O on the phases. 39 ref. (M24c, M26r, U, Zr, Ta, Cb, C)

142-M. (German.) **Oxidation Figures on Metal Surfaces.** S. Yamaguchi. *Werkstoffe und Korrosion,* v. 8, Dec. 1957, p. 733-735.

Microscopic investigations demonstrate oxide layers are genuine oxidation figures, enabling lattice-type determination. 5 ref. (M26r, R1h)

143-M. (Hungarian.) **New, Simple and Quick Process for Determination of Grain Size of Iron Alloys.** Ferenc Boda. *Kohaszati Lapok,* v. 12, June 1957, p. 246-249.

4 ref. (M27c; Fe)

144-M. (Russian.) **Peculiarities of Surface Structure of Decarburized Castings of Malleable Iron.** M. A. Krishtal, I. P. Fominykh and A. Ya. Tseitlin. *Liteinoe Proizvodstvo,* Aug. 1957, p. 22-23.

Defect formation on surface of malleable iron castings on annealing. 8 ref. (M28p, J23, 9-71; CI-s)

145-M.* Constitution of Rhenium-Molybdenum Alloys. J. M. Dickinson and L. S. Richardson. *American Society for Metals, Transactions,* v. 51, Preprint no. 72, 1957, 18 p.

Two intermediate phases, sigma and chi, were found. Sigma undergoes a peritectic decomposition at 2645° C. and chi undergoes a peritectoid decomposition at 2080° C. There is a eutectic at 2505° C. at 65 wt. % Re. Molybdenum dissolves up to 59% Re; Re dissolves up to 12% Mo. 4 ref. (M24b; Re, Mo)

146-M.* Electrolytic Migration of Carbon in Steels. William Hume-Rothery. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 113.

The view that carbon dissolved in austenite exists in the form of C + ions is criticized on the grounds of ionic radii and of the energies involved. It seems more probable that the carbon atoms are bound by forces resembling those of covalent linkages, and it is shown how this concept can be reconciled with the electrolytic migration data. 4 ref. (M25h; ST, *C*)

147-M. Localized Electrons in Body-Centred Cubic Metals. J. S. Griffith and L. E. Orgel. *Nature,* v. 181, Jan. 18, 1958, p. 170-172.

13 ref. (M25, M26)

148-M. (English.) **Lifetime Measurements of Minority Carriers Across and Along a Dislocation Wall in a Germanium Crystal.** Ryukiti R. Hasiguti and Etsuyuki Matsuura. *Physical Society of Japan, Journal,* v. 12, Dec. 1957, p. 1347-1351.

Recombination diameter of a dislocation in a dislocation wall was measured in n-type germanium. It is 2.2 x 10^{-8} cm. From this value a relation between lifetimes and densities of randomly distributed dislocations was obtained. 12 ref. (M26b, 14-61; Ge)

149-M. (English.) **Lifetime Measurements of Minority Carriers in Deuteron Irradiated Germanium Crystals.** Ryukiti R. Hasiguti, Etsuyuki Matsuura and Shiori Ishino. *Physical Society of Japan, Journal,* v. 12, Dec. 1957, p. 1351-1354.

Fictitiously long lifetimes were obtained which suggest the formation of a p-type thin layer by the deuteron irradiation. 5 ref. (M26b, 2-67, 14-61; Ge)

150-M. (English.) **New Oxidizing Method for Revealing Austenitic Grain.** Yunoshin Imai and Hiroshi Hirotani. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 9, Dec. 1957, p. 468-475.

Superiority of new oxidizing method using borax as compared to such techniques as thermal etching,

fracture and martensitic etching. (M20s, M27c; ST)

151-M. (Hungarian.) **Dilatometric Determination of Retained Austenite.** Zoltan Csepiga. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 156-162.

Mathematical solution showing retained austenite in percent. 23 ref. (M23b, N8n)

152-M.* **Micro-Constituents in Steels.** K. W. Andrews and H. Hughes. *Iron and Steel,* v. 31, Feb. 1958, p. 43-50.

Electrolytic technique for isolating microconstituents, X-ray techniques for examination, application of the findings to five types of steel, tempered martensite, low-carbon, sigma phase, Cr-Mo-Ti, and Cr-Mo steels. 23 ref. (M23, M26r; ST, AY)

153-M. Grinding and Polishing Especially of Metallographic Specimens. Z. Ministr. *Industrial Diamond Review,* v. 18, Jan. 1958, p. 7-10.

(To be continued.) (M20p)

154-M. Etch Pits in Indium Antimonide. W. Bardsley and R. L. Bell. *Journal of Electronics and Control,* v. 3, July 1957, p. 103-105.

8 ref. (M20q; In, Sb)

155-M. Spiral Etch Pits in Germanium. R. G. Rhodes, K. O. Batsford and D. J. Dane-Thomas. *Journal of Electronics and Control,* v. 3, Oct. 1957, p. 403-408.

A technique using an iodine etching solution reveals a spiral terraced structure on Ge single crystals. 4 ref. (M20q, M26; Ge, 14-61)

156-M. Crystalline Perfection of Some Semiconductor Single Crystals. R. L. Bell. *Journal of Electronics and Control,* v. 3, Nov. 1957, p. 487-493.

12 ref. (M26; Ge, Si, 14-61)

157-M. Observation of Vacancy Sources in Metals. R. S. Barnes, G. B. Redding and A. H. Cottrell. *Philosophical Magazine,* v. 3, Jan. 1958, p. 97-99.

Grain boundaries are effective sources of vacancies, but twin boundaries are not. (M26s, M27f; Cu)

158-M.* **New Data Concerning Uranium Alloys.** *Soviet Journal of Atomic Energy,* v. 2, no. 6, 1957, p. 712-714. (Translated by Consultants Bureau, Inc.)

The U-Bi system studied metallographically and by X-ray diffraction, neutron diffraction and thermal analysis. Alloys containing up to 30% U were prepared in a graphite crucible at about 1300° C. from pieces of U and Bi (99.99%), the latter having been filtered through a porous Pyrex filter. Alloys with a higher U content were prepared from U powder and crushed Bi, the U powder being obtained by hydrogenation and dehydrogenation in the same graphite crucible in which the alloy was prepared. The system is of practical interest, since Bi is very fusible and has a low thermal neutron cross section, and U-Bi alloys may be used as liquid nuclear fuels. 5 ref. (M24b, 1-60; U, Bi)

159-M. (English.) **New Reagent for Microscopic Strain Analysis in Steel.** Ariel Taub. *Research Council of Israel, Bulletin,* v. 6C, Nov. 1957, p. 29-32.

A newly discovered Au reagent permits quantitative microscopic strain analysis of steel specimens. 8 ref. (M21c, M20q, Q25n, ST)

160-M. Diagrammatic Representation of the Texture Data for Drawn Materials. D. S. Eppelsheimer and K. K. Tangri. *University of Missouri, School of Mines and Metallurgy, Bulletin,* Technical Series 87, 1957, 3 p.

(M26c, G4)

161-M. X-Ray Diffraction Technique for Quantitative Determination of Texture Variation in Drawn Rods of Cubic Metals. D. S. Eppelsheimer and K. K. Tangri. *University of Missouri, School of Mines and Metallurgy, Bulletin,* Technical Series 87, 1957, 8 p.

(M21f, M26c, G4, 4-55)

162-M. (English.) **Crystal Structures of Zr_5Ge_3, Ta_5Ge_3 and Cr_5Ge_3.** Erwin Parthe and John T. Norton. *Acta Crystallographica,* v. 11, Jan. 1958, p. 14-17.

4 ref. (M26; Cr, Ge, Ta, Zr)

163-M. (German.) **Progress in Constitution Research.** H. F. Spengler. *Metall,* v. 12, Feb. 1958, p. 105-113.

Literature review covering 1956-1957 with reference to binary and multiple systems. 109 ref. (M24)

164-M.* **Alloys of Aluminum, Thorium and Uranium.** Gene E. Bobeck and H. A. Wilhelm. Iowa State College. *U. S. Atomic Energy Commission,* ISC-832, Dec. 1955, 26 p. (Available at U. S. Office of Technical Services, $1.)

The Al-rich corner of the ternary alloy system Al-Th-U investigated by thermal and microscopic analyses to determine an area of low-melting alloys that could be used as a liquid metal fuel in U_{233} breeder reactors. There is a rather wide range of compositions, varying from 13% U at 0% Th to 0% U at 25% Th, that can be maintained in a one-phase

liquid solution at temperatures even lower than 640° C. 7 ref.
(M24c, T11g, 17-57; U, *Al, Th,* SGA-d)

165-M. Technique for Obtaining Thin Foils of Aluminum and Aluminum Alloys for Transmission Electron Metallography. R. B. Nicholson, G. Thomas and J. Nutting. *British Journal of Applied Physics,* v. 9, Jan. 1958, p. 25-27.

Structural changes produced by aging Al-Cu and Al-Zn-Cu alloys investigated by examining foils in the electron microscope. 6 ref.
(M21e, N7a, 4-56; Al, *Cu, Zn*)

166-M.* Intragranular Substructures in High-Purity Nickel. Paul Feltham. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 237-240.

Technique for developing dislocation etch pits in Ni. In specimens annealed at 850-900° C., the formation of a cell structure with mesh size of the order of 20μ is observed; the density of etch pits delineating it is approximately 3×10^5 per sq. cm. A regular block structure of edge dislocations with a characteristic inter-dislocation spacing of 2-3μ and a corresponding dislocation density of about 10^7 per sq. cm. exists side by side with the cell structure. 14 ref. (M26b; Ni-a)

167-M. A Note on the Zinc-Rich Alloys of the System Zinc-Iron-Nickel. G. V. Raynor and J. D. Noden. *Institute of Metals, Journal,* v. 86, Feb. 1958, p. 269-271.

Investigation by metallographic and X-ray methods. Extraction of crystals by slow anodic solution and examination confirmed the formation of ternary crystals, the composition of which is analogous to the binary compound Zn-Co.
(M24; Zn, *Fe, Ni*)

168-M. Modern Metallography. H. P. Roth. *Metal Progress,* v. 73, Mar. 1958, p. 70-72.

One of the meetings arranged for the Second World Metallurgical Congress in Chicago last November was organized by the U. S. Atomic Energy Commission's Internal Group on Metallography, and considered many advanced metallographic techniques using ultraviolet and visible light, X-rays, emitted rays and electron beams. (M20, M21, M23)

169-M.* The Metallographic View. Pt. 43. Effect of Hardening Temperature on the Micro-Structure of H13 Hot Work Die Steel. R. F. Harvey. *Steel Processing and Conversion,* v. 44, Feb. 1958, p. 82-83.

Coarsening of microstructure above 1900° F. (M27d, 2-64; TS-k)

170-M. Effect of Fast Neutron Irradiation on the Recombination of Electrons and Holes in Germanium Crystals. V. S. Vavilov, A. V. Spitsyn, L. S. Smirnov and M. V. Chukichev. *Soviet Physics-JEPT,* v. 5, Nov. 1957, p. 579-582. (Translation by American Institute of Physics.)

Irradiation of Ge crystals with fast neutrons leads to an increase of the rate of volume combination. The probability of recombination trapping of charge carriers by defects which appear as result of irradiation is estimated. 15 ref.
(M25m, P15, 2-67; Ge)

171-M. (French.) **Contribution to the Study of the Iron-Carbon Equilibrium Diagram. Solubility of Carbon in Pure Iron.** Paul Gendrel and Leon Jacque. *Comptes Rendus,* v. 246, Jan. 27, 1958, p. 596-599.

Solubility of carbon was found to decrease when degree of initial purity of the metal was increased.
(M24b; Fe, C)

172-M.* (French.) **Electron Microscope Study of a Skeleton Structure Formed by Tungsten Carbide Grains in Hard Alloys.** R. Bernard and S. Bernard. *Proceedings of the Third International Conference on Electron Microscopy, London, 1954,* Royal Microscopical Society, 1956, p. 211-212.

Study showed that, contrary to views of Garland and Norton (M.I.T.), a skeleton structure of tungsten carbide grains is formed in hard alloys composed of tungsten carbide and cobalt. Cobalt was eliminated by boiling alloy in hydrochloric acid. (M27d; W, Co, 6-69)

173-M.* (French.) **Examination of Thin Metal Specimens by Electron Microscopy and Diffraction.** R. Castaing. *Proceedings of the Third International Conference on Electron Microscopy, London, 1954,* Royal Microscopical Society, London, 1956, p. 379-383.

By means of electrolytic polishing followed by bombardment with ions, metallurgical specimens may be thinned down sufficiently for observation by transmission electron microscopy or diffraction. Advantages of this method; possibility of thinning during course of observation.
(M21e, M22h)

174-M.* (German.) **Examination of Aluminum-Copper Alloys by Means of Etch Coloring Method.** F. Erdmann-

Jesnitzer and W. Bernhardt. *Metall,* v. 11, Dec. 1957, p. 1032-1037.

Purpose of the etch coloring method in investigation of distribution regularity in solid solutions. Experimental technique; results. 16 ref. (M20q; Al, Cu)

175-M.* (German.) **Examples of Application of New Techniques in Metallography.** L. Koch, G. Hein and S. Keste. *Metall,* v. 11, Dec. 1957, p. 1038-1045.

Preparing specimens; mechanical, anodic and chemical polishing; examination in polarized light; use of color photography in microscopy; phase contrast microscopy and high-temperature microscopy; measurement of roughness by interference tester; testing of microhardness. 19 ref. (M20, M21, S14)

176-M. (German.) **Microstructure and Mechanical Properties of Structural Steels.** R. Mitsche and A. Legat. *Radex Rundschau,* no. 5-6, 1957, p. 784-802.

10 ref.
(M-general; Q-general; ST, SGB-s)

177-M. (German.) **Investigations of Nonmetallic Inclusions in Free-Cutting Rimming Steel.** H. Hoff, G. von der Dunk and H. Lessing. *Radex Rundschau,* no. 5-6, 1957, p. 832-839.

Determination of amount of nonmetallic inclusions in ingots of free-cutting rimming steels by various methods; chemical constitution, distribution of inclusions in ingots. 5 ref. (M28; ST-d, SGA-k, 9-69)

178-M. (German.) **Topologic Identification of Structural Members in Metallic and Fireproof Materials.** F. Grasenick. *Radex Rundschau,* no. 5-6, 1957, p. 843-856.

Evaluation of metallographic methods. 45 ref. (M-general)

179-M. (German.) **Accidental Disturbance Error in X-Ray Fluorescence Spectroscopy.** F. Ebert and A. Wagner. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 646-649.

(M21f)

180-M.* (German.) **Microradiographic Study of Rolling Process.** F. Erdmann-Jesnitzer and Fritz Gunther. *Zeitschrift für Metallkunde,* v. 49, Jan. 1958, p. 9-16.

Microradiographic investigation of orientation in rolling, direction and of destruction of Al-Ni and Al-Fe crystals in Al alloys. 14 ref.
(M23n, M26c; Al)

181-M. (German.) **Observations of Decomposition Phenomenon on Metal Crystallites.** Ernst Brüche and Helmut Poppa. *Zeitschrift für Metallkunde,* v. 49, Jan. 1958, p. 17-21.

17 ref. (M26, M21e; Cu)

182-M. (German.) **Examination of Ferromagnetic Substances by Electron Diffraction.** Sh. Yamaguchi. *Zeitschrift für Metallkunde,* v. 49, Jan. 1958, p. 52-54.

(M22h, P16)

183-M. (German.) **Magnetic, Electric and Electron-Optical Investigations of Thermal Transformation of Cathodic Dispersed Nickel Layers.** L. Reimer. *Zeitschrift für Physik,* v. 149, no. 4, 1957, p. 425-431.

4 ref.
(M-general, P16, N-general; Ni)

184-M.* (Italian.) **Thermodynamic Research on Metal Systems. Note 10. Definition of the Miscibility Gap and Replotting of the Phase Diagram of the Zn-Cd-Bi System.** Mario Fiorani and Luigi Oleari. *Ricerca Scientifica,* v. 27, Dec. 1957, p. 3614-3628.

From emf. measurements taken along four pseudo-binaries with constant Cd and Bi atomic ratios of 6.3/1, 3/1, 1/1 and 1/3 respectively, partial molar thermodynamic quantities for Zn in Zn-Cd-Bi system were obtained. Quantities were used to define miscibility gap at 450, 500 and 550° C., and a graphic procedure was devised to overcome problems arising from position of gap. Partial molar quantities were recalculated for Bi and Cd, thus permitting reconstruction of complete phase diagram. 25 ref.
(M24c; Zn, Cd, Bi)

185-M.* (Russian.) **Influence of Fiber Orientation on Contact Fatigue Resistance of Hardened Steels.** A. S. Shein. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 61-66.

It is possible to discern three kinds of orientation of fibers by macroscopic examination: longitudinal, transverse and facial. Hardened steel with transversely oriented fibers is less tough than that with fibers having facial orientation, but its contact fatigue life is 3 to 5 times longer. (M28, Q7; ST)

186-M.* (Spanish.) **Thermodynamic Theory of Equilibrium Diagrams. Pt. 8. Equilibria in Condensed Ternary Systems.** Francisco Munoz del Corral. *Instituto del Hierro y del Acero,* v. 10, Oct-Dec. 1957, p. 412-428.

Forms of graphic representation of equilibria in ternary systems; functions of ternary phases; internal stability and zones of immisci-

bility; two, three and four-phase equilibria. 8 ref. (M24c, P12)

187-M.* Veining in Ferrite. A. Hultgren, A. Josefsson, E. Kula and G. Lagerberg. *Iron and Steel Institute, Journal,* v. 188, Mar. 1958, p. 247-261.

Microscopic examination of structures appearing in ferrite on hot deformation. Various types of veins and conditions of their formation and regularity. Disappearance and restoration of veins. (M27, N8j; ST)

188-M. Metallographic Application of X-Ray Scanning Microanalysis. D. A. Melford and P. Duncumb. *Metallurgia,* v. 57, Mar. 1958, p. 159-161.

A technique using a fine-focus electron beam for determining the composition of a minute area on the surface of a metal. (M21f, S11n)

189-M.* The Metallographic View. Pt. 42. Grain Size of High Speed Steel—Effect of Reduction. R. F. Harvey. *Steel Processing and Conversion,* v. 44, Jan. 1958, p. 33-34.

Effects of heat treatment, composition, undissolved carbide and ingot size reduction on the grain size of M10 Mo high speed steel.
(M27c; TS-m, *Mo*)

190-M.* Factors Controlling the Grain Size of 5 Per Cent Chromium Hot Work Die Steels. Pt. 1. R. F. Harvey and C. T. Fletcher. *Steel Processing and Conversion,* v. 44, Mar. 1958, p. 129-136, 165.

Size of austenitic grains in AISI H11, H12, H13 and H14 steels is determined principally by austenitizing temperature and time, and composition of steel. Forging and annealing have less effect.
(M27c, 2-64, 2-60; TS-k)

191-M. High-Temperature Aqueous Corrosion Product Films on Aluminum. V. H. Troutner. Hanford Laboratories. *U. S. Atomic Energy Commission,* HW-53389, Nov. 15, 1957, 38 p.

The corrosion product films formed on Al alloys 1245 and X8001 in water at 310° C. were examined by X-ray diffraction and by electron and optical miscroscopy. A technique was developed for replicating the inner surface (the surface adjacent to the base metal) of the corrosion product films for electron microscope examination.
(M21c, M21e, M20r, R4; Al-b)

192-M.* (French.) Quantitative Study of the Drawing Texture of Copper Wire. R. Faivre. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 53-60.

Studied by use of a recording microphotometer with a special stage which made it possible to explore a quarter of a Debye-Scherrer ring. Quantities defined and measured were proportion of crystallites conforming to laws of preferred orientation, distribution of crystallites between fiber textures [111] and [001], angular dispersion of actual orientation around ideal orientation corresponding to a perfect fiber. 10 ref. (M26c; Cu, 4-61)

193-M. (German.) Texture Determination in Metallic Materials by Counting Tube Method. Pt. 1. General Considerations and Problems. F. Haeszner. *Metall,* v. 12, Feb. 1958, p. 89-95.

Determination of texture by correlation of intensity of reflected X-rays. (M26c)

194-M.* (German.) Silicoborides of the Transition Metals Vanadium, Columbium, Tantalum, Molybdenum and Tungsten. H. Nowotny, R. Kieffer and F. Benesovsky. *Planseebericht für Pulvermetallurgie,* v. 5, Dec. 1957, p. 86-93.

Investigation of ternary systems for high-temperature alloys by X-ray, microscopy and thermo-analysis. (M24c, M26q; SGA-h)

195-M.* (German.) Note on Partial System UC-ThC. H. Nowotny, R. Kieffer, F. Benesovsky and E. Laube. *Planseeberichte für Pulvermetallurgie,* v. 5, Dec. 1957, p. 102-103.

Technique of preparation of uranium monocarbide and thorium monocarbide. Examination of their behavior by X-rays. Wide miscibility of components—carbides and oxides. (M24d; U, Th)

196-M.* (Italian.) Structure of Anodic Oxide Coatings on Aluminum. M. Paganelli. *Alluminio,* v. 27, Jan. 1957, p. 3-12.

Coatings were examined by three techniques involving use of electron microscope. Results confirm theory of Keller, Hunter and Robinson concerning cellular structure of porous anodic oxide coatings. 30 ref.
(M27d; Al, 8-73)

197-M. (Japanese.) Employment of Recent Advances in the Optical and Electron Microscope. Hideo Nishimura. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 3-4.

(M21c, M21e)

198-M.* (Czech.) Contribution to Metallographic Examination of Trans-

former Steel. Ivan Hrivnak. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1094-1096.

Electron microscope examination of transformer steel containing 0.03% C, 4.39% Si, 0.10% Mn, 0.1% Cu reveals many cases of twinning and multiplying ferritic grain growth. (M27; ST, SGA-n)

199-M.* (Book.) **Powder Method in X-Ray Crystallography.** Leonid V. Azaroff and Martin J. Buerger. 342 p. 1958. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $8.75.

Techniques for determining crystal structure and identifying materials using powder X-ray diffraction. Equipment, theory and mathematical analysis of diffraction patterns. (M22g)

200-M. Constitution of the System Indium-Thallium-Lead, With Reference to Structural Transformations. G. V. Raynor and J. Graham. *Faraday Society, Transactions,* v. 54, Pt. 2, Feb. 1958, p. 161-173.

12 ref. (M24c; Pb, In, Tl)

201-M.* Note on Aluminum-Rich Aluminum - Manganese - Copper - Nickel Alloys. G. V. Raynor and C. R. Faulkner. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 323-324.

Metallographic examination of slowly cooled alloys, and of alloys annealed for long periods at 500° C., indicates that the ternary compounds $Ni_4Mn_{11}Al_{30}$ and $Cu_2Mn_8Al_{20}$ form a complete series of solid solutions in the quarternary system Al-Mn-Cu-Ni. (M24d; Al, Mn, Cu, Ni)

202-M. Comparison of Electron With Neutron Irradiation of Alpha Brass. A. C. Damask. *Physics and Chemistry of Solids,* v. 4, no. 3, 1958, p. 177-181.

Decrease in electrical resistivity of alpha brass which arises from increased short-range order is used as a measure of migration of excess vacancies during neutron and electron irradiation. Theoretical estimates indicate that about 14 times more vacancies are produced by the electron than by the neutron irradiation. 9 ref.
(M26s, 2-67, P15g; Cu-n)

203-M.* (French.) **Use of the Positron for Study of the Electronic Structure of Metals.** E. Daniel. *Journal de Physique et le Radium,* v. 18, Dec. 1957, p. 691-693.

It appears that the disturbance introduced with the positron may be too strong to permit much accuracy in studies of electronic structure, as screening effect obscures other phenomena. However, this technique provides an excellent pattern for study of the screening effect itself, a study which could be extended to analysis of X-ray spectra of solids. Similar problems of Knight effect in alloys are posed in field of nuclear magnetic resonance. (M25, P16f)

204-M. (German.) **Investigation of Metal Structures at High and Low Temperatures.** Rys Premysl, Bezdék Ladislav, Ciha Karel, Ruzicka Dalibor and Skarek Jiri. *Acta Technica,* v. 3, Jan. 1958, p. 58-83.

Principles and importance of high and low-temperature microscopy. Review of foreign apparatus and description of a high-temperature microscope and cooling chamber. Tests on carbon and alloy steels, cast iron and nonferrous metals and alloys. (M21c, 1-53; ST, CI, 2-62, 2-63)

205-M.* (German.) **Etching Process for the Determination of Corroison Resistant Chromium-Nickel and Chromium - Nickel - Molybdenum Steels (Stainless Steels).** Friedrich Karl Naumann and Wolfhard Carius. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 641-644.

Etching process to discriminate between stainless steels with and without Mo. Utilizes the coloring effects of an etching solution of 100 cc. HCl + 200 cc. H_2O + 30 g. $K_4Fe(CN)_6$. Another indication was $K_3Fe(CN)_6$. The steel without Mo showed many given precipitations indicating a less stable alloy. 12 ref. (M20q; SS, *Mo*)

206-M. (German.) **An Electron Microscope Method for Direct Observation of Fracture Structures.** Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 663-666.

Vaporized carbon was applied under vacuum to fractured surfaces of austenitic and ferritic steel specimens. The carbon layer is then separated electrolytically. This process destroys the structure of the fracture, but the carbon matrix obtained is of high quality and permits close observation of the crystal structure. 9 ref. (M21e; ST)

207-M.* (German.) **Equilibrium Conditions in System Iron (II) Oxide-Zirconium Oxide.** Wilhelm Fisher and A. Hoffmann. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 739-743.

System investigated at temperatures above 1300° C. by thermal analyses, microscopic and X-ray methods and slag equilibria determination. A phase diagram for temperatures betwen 1300 and 1800° C. was designed, showing that iron (II) oxide has no solubility for zirconium oxide, while zirconium oxide absorbs 3% FeO at 1800° C. and 4% FeO at 1450° C. A eutectic composition is found at 1330° C. with 3% ZrO_2. Formation and lattice structure of the crystals. (23 ref.) (M24d; Fe, Zr, 14-68)

208-M. (German.) **Submicroscopic Observations on Thin Iron Films.** Wolfgang Pitsu. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 745-752.

Extremely thin iron films were sprayed in the form of vapor on a base material under vacuum and then carefully separated. The specimens were observed under an electron microscope with penetrating beams. Some specimens were annealed at 450 to 750° C. It was found that the crystals collect in certain areas, forming crystal clusters. Thin layers along crystal boundaries are believed to be iron oxide. Depending on the thickness of the initial iron vapor film, crystal drops, crystal chains or crystal layers are formed within seconds at 600° C. 29 ref.
(M26n; Fe, 14-62)

209-M.* (German.) **Methods for Observation of Metal Surfaces, From Straight Beam Microscopy to Contrast-Interferometry.** H. Arndt. *Metall,* v. 11, Oct. 1957, p. 864-868.

Normal microscopy requires etching, which gives sufficient resolution of image; frequently, however, it affects the microstructure of the surface. A double prism, put into the beam of a microscope, modulated the complex amplitude of the light reflected from the object. Height differences of less than 20 angstroms can now be observed. Thus electrolytic polishing could be used instead of etching. The results are demonstrated on electrolytic copper and alpha brass (33% Zn). 10 ref. (M21, 1-53)

210-M. (German.) **Electron Microscope Studies on the Fabrication of Gold Foil.** E. Bruche and K. J. Schulze. *Metall,* v. 12, Jan. 1958, p. 21-27.

After the last heating process, gold foil permits flow of electrons, so its structure (a net of rectangles) can be seen with the help of an electron microscope. Defects such as perforations caused by base metals (zinc, iron, etc.) can be observed. 8 ref. (M21e; Au-b, 4-56)

211-M.* (German.) **Investigation of System Aluminum-Zinc Decomposition, Size Change, Hardness Diagram and Resistance to Upsetting.** E. Pelzel. *Metall,* v. 12, Mar. 1958, p. 197-201.

Experiments with Al-Zn alloys containing various amounts of Zn. With Zn content above 79% the concentration of beta crystals and of solid solution changes slightly above 275° C. Annealing at 300° C. produces two-phase structure. Alloy with 61.4% Zn consists, at temperature just below decomposition point, of 62% beta crystals (21% Al) and 38% beta-prime crystals (66% Al). (M24b; Al, Zn)

212-M. (Russian.) **Investigation of Metallic Structure With Electron Microscope by Use of Carbonic Impressions.** A. V. Smirnova and G. A. Kokorin. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1446-1448.

(M21e, M20r)

213-M.* **X-Ray Study of Faults in Body-Centered Cubic Metals.** O. J. Guentert and B. E. Warren. *Journal of Applied Physics,* v. 29, Jan. 1958, p. 40-48.

Effect on X-ray diffraction pattern of deformation faults and twin faults occurring at random on the (211) planes of a b.c.c. lattice. In single crystal reflections, deformation faults produce peak shifts and peak broadening, and twin faults produce a peak asymmetry and peak broadening. For a powder pattern it is necessary to average over the different components of a powder-pattern peak; the peak shifts average cut to zero, and the peak asymmetries to a quantity which is generally too small to measure. Both types of fault produce a line broadening which varies strongly from one powder peak to another. 14 ref. (M22f, M26s, Q24c)

214-M. **Energy-Band Structure of a Hypothetical Carbon Metal.** Russell C. Casella. *Physical Review,* v. 129, Jan. 1, 1958, p. 54-60.

29 ref. (M26r; C)

215-M. **Distortion of the Lattice Around an Interstitial, a Crowdion, and a Vacancy in Copper.** Ludwig Tewordt. *Physical Review,* v. 109, Jan. 1, 1958, p. 61-68.

A general method for calculating lattice distortions around point defects is proposed. Atoms in a sufficiently large region I around the defect and in a "boundary" region II around region I are treated as discrete particles. A set of proper elastic solutions is joined to the displacements of the atoms in region II. The equilibrium state of the lattice is determined by successive solution of sets of linear algebraic equations. Actual calculations have been done with the help of the Illiac digital computer for an interstitial, a crowdion, and a vacancy in copper. 26 ref. (M26; Cu)

216-M. **Preferred Orientations Predictable in Alpha Uranium.** C. Fizzotti. *United Kingdom Atomic Energy Authority,* 304/MR/157, Jan. 1957, p. 3-13. (Translation from *Energia Nucleare,* v. 3, 1956, p. 102-112.)

Plastic deformation causes, in a polycrystalline aggregate, certain orientations of crystallographic planes and directions, depending on the particular type of deformation imposed. It is then said that the aggregate has assumed a deformation texture. The textures caused by fixed deformations in one phase of uranium, the most interesting phase from the point of view of metallurgy, orthorhombic alpha uranium are forecast. 7 ref. (M26c; U)

217-M. (English.) **On the Application of a Variational Principle to Binary Alloys in the Ising System.** I. A. Kvasnikov. *Soviet Physics, Doklady,* v. 2, no. 2, 1957, p. 158-160. (Translation by American Institute of Physics.)

(M24b, P-general)

218-M.* (French.) **Autoradiographic Proof of Preferred Self-Diffusion in Polygonization Sub-Boundaries of Alpha Iron.** Pierre Coulomb, Claude Leymonie and Paul Lacombe. *Comptes Rendus,* v. 246, Feb. 24, 1958, p. 1209-1212.

Autoradiographic study of specimen of pure polycrystalline iron into which radioactive iron was diffused at 700° C. revealed network of grain boundaries and fine intergranular network structure. Comparison with micrographic structure showed this network structure to be identical with that of polygonization subboundaries. This constitutes direct proof of preferred self-diffusion in subboundaries.
(M23q, M27f, N1d; Fe)

219-M.* (French.) **Autoradiographic and Micrographic Detection of Previous Gamma Boundaries in Iron.** Pierre Coulomb. *Comptes Rendus,* v. 246, Mar. 3, 1958, p. 1421-1424.

Prior gamma boundaries can be observed after etching, heat treatment or intergranular self-diffusion. Comparison of network structures obtained shows similar influence of geometric parameters on segregation of impurities and on intergranular self-diffusion.
(M23q, M27f, N1d; Fe)

220-M.* (French.) **Identification of Incipient Fatigue Cracks in Anisotropic Metals.** H. de Leiris and C. Corfa. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 101-106.

Beginning of a fatigue crack is normally identified by morphological analysis of its surface. This procedure is inadequate when material is not sufficiently isotropic; a minute examination of external path of fissure can be substituted before a complete breakdown has occurred. This highly delicate form of investigation is greatly facilitated by Jacquet-Van Effenterre replica technique.
(M23, M20r, Q7, 9-72)

221-M.* (German.) **Isolation of Sulphide Inclusions and Relationship Between Properties of Steel and Inclusions.** Kurt Born. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 179-187.

Isolation of inclusions in steels by decarburizing, quenching from 700°, electrolysis, group separation. Chemical and optical properties of sulphide inclusions depending on composition of steel. Influence of Al on behavior of inclusions and properties of corresponding steel. Examination by X-ray and electron microscope. (M23; ST, 9-69)

222-M.* (German.) **Investigation of Structure of System Iron-Chromium-Carbon.** Karl Bungardt, Ernst Kunze and Elisabeth Horn. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 193-203.

Investigation of position of melting planes and four-phase planes by metallographic, dilatometric and chemical methods and also by X-ray at melting point and in solid state. Electrochemical isolation of carbides and their composition. Phase diagrams. (M24c; Fe, Cr, C)

223-M. (Russian.) **Electropolishing and Electro-Etching of Microsections of Metalloceramic Materials.** O. K. Teodorovich and E. T. Kachkovskaya.

Zavodskaya Laboratoriya, Jan. 1958, p. 57-60.

(M20p, M20q; 6-70)

224-M.* **Fractographic and Metallographic Techniques for Molybdenum and Molybdenum-Base Alloys.** W. C. Coons. Paper from "The Metal Molybdenum", American Society for Metals, p. 394-407.

Molybdenum is difficult to prepare by conventional mechanical polishing techniques because of its extreme resistance to abrasion. Suitable techniques—powder mount technique; polish-etch-buff technique; fractographic technique; electrolytic polishing technique; etching techrique. 4 ref.
(M20p, M20q, M23p; Mo)

225-M. **Metallographic Study of the Carbides in High-Speed Steels.** M. S. Chaadaeva. *Zavodskaya Laboratoriya,* v. 23, no. 7, 1957, p. 811-813. (Henry Brutcher, Altadena, Calif., Translation no. 4065.)

Previously abstracted from original. See item 173-M, 1957.
(M26r; TS-m)

226-M. (Czech.) **Simple Extraction Replica for the Study of Fine-Grain Phases.** Jaroslav Jezek. *Hutnické Listy,* v. 13, Mar. 1958, p. 213-220.

21 ref. (M21e, M20q, M27c)

227-M. (French.) **Some New Applications of Microfractography.** J. Plateau, G. Henry and C. Crussard. *Publications de l'Institut de Recherces de la Sidérurgie,* Series A, no. 160, June 1957.

Microfractography is the examination of rupture surfaces by the electron microscope. Method permits local observation of the mode of rupture, submicroscopic inclusions and precipitates. Interesting results can be obtained even with relatively inexpensive electron microscopes of not too high a resolving power. (M21e, M23p)

228-M.* (French.) **Appearance and Stability of the Polygonized State in Pure Iron and Aluminum Crystals.** C. de Beaulieu. *Publications de l'Institut de Recherches de la Sidérurgie,* Series A, no. 132, Apr. 1956.

Dislocations of the crystalline lattice may, at a certain temperature, be shifted and reassembled to form new boundaries within the crystal, a phenomenon called polygonization. Polygonization of the pure metal was found to occur after quenching and annealing; it represents a very stable state. Studies on large polygonized single crystals revealed new properties of very pure Fe and Al and the tendency to polygonization as a function of the purity of the metal.
(M26n, M26b; Al-a, Fe-a, 14-61)

229-M.* (German.) **Investigation of Metal Structures at High and Low Temperatures. Pt. 3. High and Low-Temperature Microscopy of Steel.** Premysl Rys, Ladislav Bezdék, Karel Ciha, Dalibor Ruzicka and Jiri Skarek. *Acta Technica,* v. 3, Feb. 1958, p. 85-120.

Development and growth of austenite grains using thermal etching. Photographs of polished surfaces show cementite or ferrite segregation in relief data on martensite formation. Preliminary experiments with thermal etching on cast iron and some nonferrous metals.
(M20q, 1-66, M27c, N8f; ST)

230-M.* (German.) **Disintegration of Wustite With Metallic Iron Present After Quenching to Temperatures Below 570° C.** Wilhelm Anton Fischer and Alfred Hoffmann. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 107-113.

Wustite specimens, containing primary iron, were melted in quartz tubes under 10^{-5} Torr pressure, then annealed at 1100 or 640° C. and then quenched to temperatures between 145 and 550° C., and held there for 30 days. The lattice constant depends on the temperature and was 4.326 Angstroms between 180 and 350° C. and 4.299 to 4.300 Angstroms at 550° C. (M26, 2-64; Fe)

231-M. (German.) **Counting Tube Method With Newly Developed Specimen Retainer for the Represntation of Textures.** Johanna Grewen, Armin Segmuller and Gunter Wassermann. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 115-118.

New specimen retainer which is adaptable both for the direct beam and reflection methods. Quantitative pole figures were obtained through given mathematical formulas, eliminating the necessity of calibration specimens. 14 ref.
(M23c, M26c, 1-53)

232-M. (German.) **Rolling and Recrystallization Textures of an Iron-Nickel Alloy With 30% Ni.** Johanna Grewen, Armin Segmuller and Gunter Wassermann. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 119-124.

In rolled plate the characteristic cubic texture was not found while in recrystallized plate the cubic texture appeared at 500° C. At increasing annealing time and temperature the cubic texture became more apparent. Another main orientation appeared in the original rolling direction. This orientation deviated from the Spinell twin orientation by 8° (angle). 30 ref.
(M26c, N5; Fe, *Ni*)

233-M. (German.) **Electron Microscope Observations of Stacking Defects During Crystal Growth of Iron Nitride Films.** Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 125-128.

Iron nitride films were observed with direct beam under an electron microscope. In face-centered cubic gamma nitride layers interference images of stacking defects were obtained and their orientation in various {111} plains is discussed. On hexagonal epsilon nitride layers no such stacking defects were found, since their formation requires too much energy. 8 ref.
(M21e, M26r; Fe, 14-68)

234-M.* (German.) **On the Three-Component System Iron-Phosphorus-Zirconium.** Rudolph Vogel and Raimond Dobbener. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 129-138.

Thermal and structural investigations of the phase diagram for the system Fe-P-Zr. Two unknown three-component compositions were discovered, FeZrP and Fe_4ZrP_2, which were formed at intense heat. Both melt at temperatures above 1600° C. In the area of P and Zr-rich alloys some samples were taken to develop the ideal phase diagram to the intersection of FeP—ZrP_2 utilizing the vapor equilibria. In the concentration area Fe-FeP-ZrP_2-Zr, five ternary peritectic transformations on seven ternary eutectic reactions were found. 14 ref.
(M24c; Fe, P, Zr)

235-M.* (German.) **Reaction Equilibria Between Liquid Lead and Metal Oxides. Pt. 1.** Erich Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Feb. 1958, p. 56-63.

Experimental technique in investigation of Pb-Sb-O and Pb-As-O systems. Chemical reactions, oxidation of liquid alloys.
(M24c; Pb, Sb, As, O, 14-60)

236-M. (Russian.) **Electron-Emission Method of Investigating Steel.** K. V. Varli, K. A. Michurina and Yu. A. Skakov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1443-1446.

(M22h; ST)

237-M. (Russian.) **Electrolytic Separation of Martensite and Austenite in Tempered Steel.** V. D. Zelenova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 60-62.

4 ref. (M23, N8a; ST)

238-M.* (Book.) **Grain Boundaries in Metals.** D. McLean. 339 p. 1957. Oxford University Press, 114 Fifth Ave., New York 11, N. Y. $8.

Modern theories of grain boundaries, energies of interfaces, energy of grain boundaries, microstructure, equilibrium segregation boundaries, influence of boundaries during deformation, sub-boundaries, diffusion long grain boundaries, boundary migration, sliding at grain boundary and intergranular brittleness. Extensive bibliography. (M27f)

239-M. (Book.) **Handbook of Lattice Spacings and Structures of Metals and Alloys.** W. B. Pearson. 1044 p. 1958. Pergamon Press, Inc., 122 E. 55th St., New York 27, N. Y. $38.

A reference book containing information on structures of binary and ternary alloys, for the use of physicists and metallurgists. Contains a compilation of known X-ray work on metals and alloys in equilibrium. (M26, M24, M22)

240-M.* **Solubility of Nickel and Chromium in Molten Lead.** T. Alden, D. A. Stevenson and J. Wulff. *AIME Transactions,* v. 212, Feb. 1958, p. 15-17.

A portion of the liquidus curve has been determined for the binary alloy systems Ni-Pb and Cr-Pb. Solubility of Ni is 0.53 at.% at 372° C. and 18.63 at. % at 1200° C.; Cr shows low solubility, 0.634 at. % at 1210° C; Mo and W were also studied and found insoluble in Pb, less than 0.005 at. % at 1200° C. 13 ref. (M24b; Pb, Ni, Cr)

241-M.* **Delta Phase Field of the U-Zr Equilibrium Diagram.** J. F. Duffey and C. A. Bruch. *AIME Transactions,* v. 212, Feb. 1958, p. 17-19.

On the basis of metallographic and cooling-rate studies of 15 U-Zr alloys, a new version of the delta phase region of the U-Zr phase diagram is proposed. 7 ref.
(M24b; U, Zr)

242-M.* **InSb-Sn System.** R. N. Zitter. *AIME Transactions,* v. 212, Feb. 1958, p. 31-32.

Intermetallic compound InSb, which is now being investigated, is similar to gray tin in its lattice structure and lattice parameter (face-centered cubic zinc blende type for InSb with lattice parameter of 6.476 A, and diamond structure for gray tin with lattice parameter of 4.46 A.) (M24d; In, Sn, Sb)

243-M. **Comments on Inverse Pole Figure Methods.** M. H. Mueller, W. P. Chernock and Paul A. Beck. *AIME Transactions,* v. 212, Feb. 1958, p. 39-40.

A three-dimensional inverse pole figure cannot be adequately replaced by two (or even three) separated two-dimensional inverse pole figures. The use of separate inverse pole figures (e.g., for the rolling direction and for the normal direction), appears to offer no significant advantage over a combination of two ordinary pole figures, (e.g., (111) and (200) for a face-centered-cubic metal), in spite of the considerable amount of computation necessary for their construction. 4 ref. (M23c, M26c)

244-M. **A Pseudo-Binary in the U-Cb-C System.** R. B. Roof, Jr., and J. J. Lombardo. *AIME Transactions,* v. 212, Feb. 1958, p. 50-51.

End products of the presumed pseudo-binary, UC and CbC, were prepared by vacuum arc melting techniques using a carbon electrode tip to remove the possibility of contamination of the binary by a third element during melting. Metallographic results strongly support the X-ray diffraction evidence that the unknown face-centered-cubic phase is a monocarbide of uranium and columbium. (M24c, U, Cb, C)

245-M.* **Titanium-Rich Corner of the Ti-Al-Si System.** F. A. Crossley and D. H. Turner. *AIME Transactions,* v. 212, Feb. 1958, p. 60-63.

Phase relationships in the temperature interval 600 to 1200° C. Metallographic examination of long-time isothermally annealed specimens was the means of investigation. 8 ref. (M24c; Ti, *Al,* Si)

246-M. **The System InSb-InBi.** E. A. Peretti. *AIME Transactions,* v. 212, Feb. 1958, p. 79.

Attention focused on the low-indium end of the ternary diagram. (M24c; In, *Sb, Bi*)

247-M.* **Etch-Pit Studies on Silicon.** W. J. Feuerstein. *AIME Transactions,* v. 212, Apr. 1958, p. 210-212.

Etch pits with good contour definition and lineage structure in Si single crystals have been developed. A dependence on angular deviation from the growth axis and spiral-type etch pits has been observed. Screw-type etch pit density increases with increasing angular deviation from the growth axis, reaching a maximum in the plane normal to the growth axis. 7 ref. (M26s, M20q; Si, 14-61)

248-M. **Notes on the R-Phase.** J. B. Darby, Jr., B. N. Das, Y. Shimomura and P. A. Beck. *AIME Transactions,* v. 212, Apr. 1958, p. 235-236.

Phase located in the Cr-Mo-Co system at 1300° C., and formerly designated as the D-phase must now be considered the same as the R-phase, previously found in the same system at 1200° C. 4 ref. (M24c, Cr, *Mo, Co*)

249-M. **Iron-Rich Phase in Aluminum Bronzes.** James A. Mullendore and David J. Mack. *AIME Transactions,* v. 212, Apr. 1958, p. 252-253.

Compositions and lattice parameters. (M24e, M26; Cu-s, *Al, Fe*)

250-M. **Electroshaping of Copper Single Crystals.** D. H. Avery, M. L. Ebner and W. A. Backofen. *AIME Transactions,* v. 212, Apr. 1958, p. 256-259.

Procedure of accelerated electropolishing to prepare a gage section in cylindrical single-crystal Cu specimens for fatigue studies. Surface produced is both polished and dimensionally accurate to ± 0.001 in. with no distortion being evidenced in back-reflection photograms of the Laue type. Time for shaping is substantially less than that required for acid cutting. (M20p, Q7, 1-60; Cu, 14-61)

251-M. **The Effect of Dissolved Tin on the Lattice Parameter of Copper.** A. F. Andresen. *AIME Transactions,* v. 212, Apr. 1958, p. 259-260.

5 ref. (M26, 2-60; Cu, *Sn*)

252-M.* **The Modification of Aluminum-Silicon Alloys by Sodium.** R. C. Plumb and J. E. Lewis. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 393-400.

Measurements by autoradiography and activation analysis revealed the distribution of Na in the microstructures of 7.5% Si aluminum alloys modified by the addition of various amounts of Na. Electron microscope studies indicate that there is no fundamental difference be-

tween modification by chill casting and modification by Na addition. 12 ref. (M27d; Al-b, *Si, Na*)

253-M. Arrangements of Dislocations in Plastically Bent Silicon Crystals. J. R. Patel. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 170-175.

Single crystals of silicon were plastically bent at an elevated temperature. The average etch-pit density after deformation is approximately two to three times higher than the calculated dislocation density. Prolonged annealing close to the melting point results in polygonization or the alinement of etch pits perpendicular to the active slip planes. Satisfactory agreement was obtained between the densities of etch pits in the annealed and polygonized specimens and the predicted dislocation densities. 14 ref. (M26b; Si, 14-61)

254-M. Thermally Precipitated Phases and Their Distribution in an Aluminum-Silicon-Cadmium Alloy. R. E. Marburger and A. W. Schluchter. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 184-188.

X-ray and electron diffraction and electron microscopy used to study the composition and distribution of the precipitated phases in a 4% Si, 1% Cd aluminum alloy as a function of thermal history. Thin precipitated crystallites detected in extraction replicas of specimens tempered above 400° F. and identified as elemental Si by selected area electron diffraction. (M24c, N7; Al, *Cd, Si*)

255-M. Zn_3As_2, a Semiconducting Intermetallic Compound. G. A. Silvey. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 226-227.

7 ref. (M26q, P15g; Zn-b, *As*)

256-M. Solid-Liquid Equilibrium in the Lithium-Lithium Hydride System. Charles E. Messer, Edwin B. Damon, P. Calvin Maybury, John Mellor and Regina A. Seales. *Journal of Physical Chemistry,* v. 62, Feb. 1958, p. 220-222.

8 ref. (M24b, N12; *H,* Li)

257-M. The Standardization of Photographic Exposures in Metallurgical Microscopy. L. E. Samuels, T. O. Mulhearn and R. M. Robb. *Metallurgia,* v. 57, Apr. 1958, p. 207-212.

(M21)

258-M. Generation of Imperfections in Germanium Crystals by Thermal Strain. P. Penning. *Philips Research Reports,* v. 13, Feb. 1958, p. 79-97.

22 ref. (M26s, Q25p; Ge)

259-M. The Constitutional and Aging Characteristics of Magnesium-Thorium and Magnesium-Thorium Ternary Alloys. A. S. Yamamoto, E. J. Klimek and W. Rostoker. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 121939, Feb. 1957, 76 p. $2.

(M24b, M24c, N7a; Mg, *Th, Zn, Zr*)

260-M. Investigation of Fe-Mn-Cr-N-C System for Heat Resistance and Oxidation Resistance Between 1200 and 2000° F. C. Hsiao and E. J. Dulis. Crucible Steel Co. of America. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131563, 158 p. $4.

(M24d, Q-general, R1h, 2-62; SS)

261-M. Partition of Soluble Carbon in Ti-6Al-4V Alloy. R. D. Seibel, R. L. Beck and L. E. Olds. University of Denver. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131603, Nov. 1957, 78 p. $2.

Microradiographic method for measurement of the microdistribution of embrittling interstitial-type solutes in alpha-beta Ti alloys. The method was based upon measurements of either lattice parameters or internal friction. (M23n, Q26s; Ti, *Al, V*)

262-M. Study of Microdistribution of Interstitial Elements in Titanium by Internal Friction Techniques. D. Gupta and S. Weinig. New York University. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131613, Nov. 1957, 52 p. $1.50.

(M27, Q22, Q27; Ti)

263-M. Phase Relationships in Magnesium Alloys. J. J. Park and L. L. Wyman. National Bureau of Standards. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131622, Oct. 1957, 33 p. $1.

Studied by thermal, X-ray and metallographic methods. The Mg-rich portions of the binary diagrams of Mg plus the rare earth metals lanthanum, cerium, praseodymium and neodymium were determined. (M24b; Mg, EG-g)

264-M. Nonmetallic Inclusions in Magnesium-Treated Iron for Rolling-Mill Rolls. A. E. Krivosheev and I. E. Lev. *Liteinoe Proizvodstvo,* no.

11, Nov. 1957, p. 18-19. (Henry Brutcher, Altadena, Calif., Translation no. 4094.)

Previously abstracted from original. See item 303-M, 1957. (M27, M23, CI-r, 9-69)

265-M. Nonmetallic Inclusions in Spheroidal Graphite Cast Iron. P. P. Arsent'ev and Yu. Ya. Orlova. *Liteinoe Proizvodstvo,* no. 4, Apr. 1957, p. 23-24. (Henry Brutcher, Altadena, Calif., Translation no. 4096.)

Previously abstracted from original. See item 303-M, 1957.

(M27, M23, CI-r, 9-69)

266-M. X-Ray Study of the System Vanadium Carbide (VC)-Tungsten Carbide (WC). M. A. Gurevich and B. F. Ormont. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 7-10. (Henry Brutcher, Altadena, Calif., Translation no. 4107.)

(M24d; V, W, C, 14-68)

267-M. Phase Diagram of Chromium-Columbium System. V. A. Eremenko, G. V. Zudilova and L. A. Gaevskaya. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 11-16. (Henry Brutcher, Altadena, Calif., Translation no. 4108.)

(M24b; Cr, Cb)

268-M. Nature of Interaction Between Titanium Boride and the Iron-Group Metals. G. V. Samsonov. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 35-38. (Henry Brutcher, Altadena, Calif., Translation no. 4122.)

Phase diagrams TiB_2-Fe, TiB_2-Co and TiB_2-Ni. Data on shrinkage in sintering, on intersolubilities, eutectic compositions and temperatures. Promise of titanium boride as a constituent of cemented carbide compositions.

(M24c, 6-69; B, Ti, Fe, Co, Ni)

269-M. Microstructure of Surface Layer Formed on Steel Hard Faced by Electrosparking. V. A. Belyanin. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 55-57. (Henry Brutcher, Altadena, Calif., Translation no. 4127.)

(M20q, M27, 8-68; ST)

270-M. On the Oxygen Content of Wustite in Equilibrium With Various Gas Phases. N. A. Hovgard and P. N. Jensfelt. *Jernkontorets Annaler,* v. 140, no. 7, 1956, p. 467-492. Henry Brutcher, Altadena, Calif., Translation no. 4141.)

Previously abstracted from original. See item 365-M, 1957. (M24; Fe)

271-M. Influence of Stresses on the Lattice Constant of Austenite. E. Scheil and E. Saftig. *Archiv für das Eisenhüttenwesen,* v. 28, no. 1, 1957, p. 49-51. (Henry Brutcher, Altadena, Calif., Translation no. 4162.)

Study of an iron-nickel alloy with 30% Ni and 0.25% Mn for austenite-lattice constant in specimens containing various amounts of martensite. (M26p, 3-66; Fe, Ni)

272-M. Formation of a Cubic Nitride in Aluminum-Containing Steels. Walter Koch, Christal Ilschner-Gensch and Helga Rohde. *Archiv für das Eisenhüttenwesen,* v. 27, Nov. 1956, p. 701-706. (Iron and Steel Institute Translation no. 900.)

Previously abstracted from original. See item 78-M, 1957. (M21, M22; AY, *Al,* 14-68)

273-M.* (English.) **New Oxidizing Method for Revealing Austenitic Grain.** Yunoshin Imai and Hiroshi Hirotani. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Dec. 1957, p. 467-475.

Oxidizing method for revealing austenitic grain boundaries in carbon and alloy steels. Polished specimens heated in high vacuum at austenitizing temperatures oxidized from 3 to 5 sec. by introducing air dipped into molten borax, then quenched in water. Method found to be reliable and technique simple. 8 ref. (M23, M27f; ST)

274-M. (French.) **New Metallographic Process for Copper.** Pierre A. Jacquet. *Cuivres-Laitons-Alliages,* no. 42, Mar-Apr. 1958, p. 37-40.

Macroscopic and microscopic structure examination of Cu alloys (including inside walls) through inexpensive, nondestructive electrolytic process. 4 ref. (M23s; Cu)

275-M. (German.) **Microscopic Investigations on the Banate Copper Slag.** C. Superceanu. *Revue de Métallurgie (Bucarest),* v. 2, 1957, p. 159-172.

Study revealed 23 definite mineral compounds classified into four groups as metal, sulphide, oxide and silicate phases. Structures, dimensions and magnetic propeties used in evaluating these metallurgical products of Cu and Fe. 15 ref. (M21c, M27; Cu, Fe, RM-q)

276-M.* (German.) **Structural Investigations on System Copper-Antimony.** Eberhard Günzel and Konrad Schubert. *Zeitschrift für Metallkunde,* v. 49, Mar. 1958, p. 124-133.

Investigations into superstructures of phases with A3-substructure in

powders and monocrystals. Description of four phases and their function intensities. Relationship of the phases to the known A3-superstructures. (M24b; Cu, Sb)

277-M. (German.) **Field Electron Emission of Palladium.** Ernst Karl Caspary and Erich Krantz. *Zeitschrift für Metallkunde,* v. 49, Mar. 1958, p. 147-152.

Field electron microscope investigations. (M21e, Pd)

278-M. Electron Diffraction From Crystals Containing Stacking Faults. Pt. 2. M. J. Whelan and P. B. Hirsch. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1303-1324.

Electron optical experiments on thin foils of stainless steel; results are in good agreement with theory. 7 ref. (M22h, M26s; SS, 4-56)

279-M. Indium-Rich Indium-Magnesium and Indium-Lithium Alloys. J. Graham and G. V. Raynor. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1354-1363.

For comparison with the results obtained from alloys of indium with solute metals from Group IIB of the periodic table, the lattice spacings of In-Mg and In-Li alloys have been measured. 11 ref. (M24b, M26; In, Mg, Li)

280-M. Band Structure of the Transition Metals. N. F. Mott and K. W. H. Stevens. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1364-1386.

45 ref. (M25, P15, P16; Cr, Fe, Co, Ni)

281-M. (French.) **Electrolytic Polishing of Carbon and Low-Alloy Steels in Fused Salts Revealing the Structure and Real Texture of the Austenite.** Zygmunt Wojcik. *Métaux Corrosion-Industries,* v. 33, Feb. 1958, p. 53-70.

Sensitivity of method permits displaying phenomena associated with the mechanism of grain growth and internal structure of the austenite, as well as physical heterogeneities and a new phenomenon of "figures of decrystallization" associated with the mechanism of anodic solution. 40 ref. (M20p, N3n, M27d; CN, AY)

282-M. (Rumanian.) **Some Problems in the Metallographic Study of Pieces Sintered From Metal Powders.** Alexander Domsa and Horia Colan. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 99-112.

8 ref. (M21; 6-72)

283-M. X-Ray Investigation on Lattice in Cold Drawn Steel Wire. Ya. S. Umansky and D. M. Zlatoustovsky. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 11-15. (Henry Brutcher, Altadena, Calif., Translation no. 4172.)

Study of microstress and static distortion of lattice depending on drawing speed and degree of deformation. Effect of temperature. Distribution of microstress and static distortion in cross cut of wire. Favorable effect of high speed in drawing. 14 ref. (M27, M21f; ST, 4-61, 9-74)

284-M. (Russian.) **Electron Microscope Two-Step Method for Study of Metal Fractures.** A. N. Pilyankevich. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 314-315.

(M21e, Q26)

285-M. (Russian.) **X-Ray Camera for Precise Measurement of Deflection Angle in Metal Crystals.** K. P. Mamedov and A. V. Kerimbekov. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 353.

(M21f, M26, 1-53)

286-M.* **Etch Figures on Silicon Iron.** Frantisek Kroupa. *Czechoslovak Journal of Physics,* v. 8, 1958, p. 186-195.

Steps, which in some points of the (110) planes become spiral pits, were obtained on the surface of silicon iron by electrolytic etching. The height of the steps, which was from tens to 1000 A, was measured by multiple beam interference. An explanation of the step-like etching is proposed and some of the mechanisms which can lead to the production of etch spirals with the above height of the steps are given. 21 ref. (M26s, M20q; Fe, *Si*)

287-M.* **The Nature of the Real Crystal.** F. C. Frank. *Institute of Metals, Journal,* v. 86, 1956-1957, p. 581-586.

Historical review of the growth of knowledge in crystal physics. Important steps include Taylor and Orowan's introduction of crystal dislocations; Smialowski's structure and Buerger's concept of lineage structure. 29 ref. (M26)

288-M. Thermal Expansion of Iron Ditelluride. J. P. Llewellyn and T. Smith. *Physical Society Proceedings,* v. 70B, Dec. 1, 1957, p. 1113-1122.

18 ref. (M23r; Fe, Te)

289-M. Stacking Faults and Dislocations in Copper-Aluminum and Co-

balt-Nickel Alloys. J. W. Christian and J. Spreadborough. *Physical Society Proceedings,* v. 70B, Dec. 1, 1957, p. 1151-1161.

17 ref. (M26b; Al, Co, Cu, Ni)

290-M. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 6. Metallurgical Examination of Austenitic and Ferritic Steels After a Long Period of Creep Stressing. Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 305-310. (Iron and Steel Institute Translation no. 676.)

Previously abstracted from original. See item 338-M, 1957.
(M27d, M26r, Q3, SGA-h, AY)

291-M. High-Temperature Microscopy. Prempl Rys. *Neue Hütte,* v. 2, 1957, p. 489-497. (Iron and Steel Institute Translation no. 698.)

Previously abstracted from original. See item 378-M, 1957.
(M21, 2-62, M27; ST)

292-M. (English.) **Investigation of the System PbTe—PbSe.** E. I. Elagina and N. Kh. Abrikosov. *Academy of Sciences of the USSR, Proceedings,* v. 3, Nov-Dec. 1956, p. 663-665. (Translation by Consultants Bureau, Inc.)

Structural diagram of the system PbTe—PbSe with the aim of determining the physicochemical nature of the alloys in this system. 11 ref. (M24c; Pb, Se, Te)

293-M. (English.) **Investigation of Metallic Compounds in Nickel Alloys Containing Aluminum.** R. B. Golubtsova and L. A. Mashkovich. *Academy of Sciences of the USSR, Proceedings,* v. 3, Nov-Dec. 1956, p. 701-704. (Translation by Consultants Bureau, Inc.)

8 ref. (M24; Ni, *Al, Cr, Ti*)

294-M.* (English.) **X-Ray Study of Cold Worked Metal Single Crystals.** Tomiya Sutoki and Koichi Nakajima. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 10, Apr. 1958, p. 77-84.

Change in the reflected intensity of X-ray due to the deformation of single crystals of Al and Zn examined with microphotometer by using Cu-K radiation. In Al single crystals, a large change in the relative intensity of (111) reflections was observed with an increase of the deformation.
(M26, M22g; Al, Zn, 14-61)

295-M.* (French.) **Electron Diffraction Study of Surface Oxidation of Silicon Carbide Crystals.** Pierre Michel and Richard Riwan. *Comptes Rendus,* v. 246, Mar. 10, 1958, p. 1542-1544.

Study of oxidation of pre-roughened face (0001) of SiC crystals heated in air at 1150° C. Under conditions described, oxidation leads to formation of thin film of crystobalite having orientation different from that of crystal. 5 ref.
(M26r, M22h; Si)

296-M. (French.) **Fast Method for Preparing Thin Metal Section for Direct Examination in the Electron Microscope.** Paul Miraud and Adrien Saulnier. *Comptes Rendus,* v. 246, Mar. 17, 1958, p. 1688-1691.

(M20p, M21e)

297-M.* (French.) **Method of Preparing Pure Aluminum Bicrystals Having Predetermined Orientations.** Claude Goux. *Comptes Rendus,* v. 246, Mar. 17, 1958, p. 1691-1693.

Two suitably oriented monocrystalline seeds are welded under vacuum to a polycrystalline platelet; relative orientations of these seeds are communicated to platelet by progressive fusion and crystallization. A portion of resulting bicrystalline material removed by electrolytic sawing can in turn be used to prepare a new bicrystal. (M26n, M20; Al-a)

298-M.* (German.) **On a Specific Texture Observed on the Surface of Tin Plated Sheets.** Hans Eggers. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 777-783.

On sheets where the tin plate was stripped after plating a surface texture was observed similar to the texture of wood. This texture appeared only on hot dipped sheets, not on galvanized materials. 9 ref.
(M26c; ST, *Sn,* 8-12)

299-M.* (German.) **Electrochemical Observations During Metallographic Etching.** Hans Jurgen Engell. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 73-76.

Electrochemical processes during etching with reducing or oxidizing acids; current density-potential diagrams determined as an aid to the selection of the correct etching solution. (M20q)

300-M.* (German.) **Conditions of Equilibrium in the System Copper-Beryllium-Aluminum. Pt. 2. Additional Investigation Concerning the Solubility-Isotherms, Structures and Their Formation.** Otto Nickel. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 57-62.

Phase boundaries in the area of transformation between $\alpha/\alpha + \beta$,

$\alpha/\alpha + \gamma$ and $\alpha + \beta/\beta$ were determined by X-ray Debye methods. Values for intensity of X-ray lines are found by mathematical methods and are compared with the experimental results. A stripe-type structure was found to be similar to those found in In-Cd alloys. 31 ref. (M24c; Ce, Be, Al)

301-M.* (German.) **Grain Boundary Precipitation as a Function of Orientation in Copper-Beryllium With Random Structure.** Wolfgang Gruhl, Dieter Ammann and Anni Stegmann. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 75-79.

Orientation of grain boundaries is connected with the amount of precipitation along the boundaries. This has been previously proven on material with preferred orientation axes, such as fiber-type textures. In random structures in 1.8% Be alloys, a relationship between precipitation and orientation of two adjacent crystals was found. Strength of precipitation increases with increasing orientation angle. 15 ref. (M27f, N7; Cu-b, *Be*)

302-M. (German.) **The Phase Diagrams of the Systems Gallium-Cadmium and Gallium-Zinc.** Theo Heumann and Bruno Predel. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 90-95.

(M24b, Ga, Cd, Zn)

303-M.* (Polish.) **Index of the Degree of Microsegregation in Commercially Pure and High-Purity Aluminum.** Antoni Piotrowski. *Archiwum Hutnictwa,* v. 2, 1957, p. 377-390.

Value of electrochemical index for microsegregation depends on purity of the Al and is notably smaller for high purity than for commercial purity. After homogenization annealing the index decreases much more for pure Al (average about 50%) than for commercial (about 16%). 7 ref. (M27a, 9-69; Al-a)

304-M. (Russian.) **Phase Analysis of Complex Titanium Alloys.** N. I. Blok, A. I. Glazova and N. F. Lashko. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 141-145.

(M24d, S11g; Ti-b)

305-M. (Book.) **Typical Microstructures of Cast Metals.** 1957. 224 p. Institute of British Foundrymen, St. John St., Chambers, Deansgate, Manchester 3, England. 84 s.

Microstructure with chemical composition and mechanical properties; cast iron, cast steel, nonferrous and light-alloy products. (M27; 5)

306-M. Structure of a New Series of MBe_{12} Compounds. F. W. von Batchelder and R. F. Raeuchle. *Acta Crystallographica,* v. 10, Oct. 1957, p. 648-649.

Crystal structures of V Be_{12}, $CbBe_{12}$, $TaBe_{12}$, $CrBe_{12}$, WBe_{12}, $MnBe_{12}$, $FeBe_{12}$ and $CoBe_{12}$ determined from single-crystal data. 7 ref. (M26; Be-b, 14-61)

307-M. Structure of Steel. Edwin Gregory and Eric N. Simons. *Edgar Allen News,* v. 37, Apr. 1958, p. 85-87.

Chromium, nickel and manganese alloys; Mn as an impurity. (To be continued.) (M27d; AY, *Cr, Ni, Mn*)

308-M.* Production of Dislocations During Growth From the Melt. W. A. Tiller. *Journal of Applied Physics,* v. 29, Apr. 1958, p. 611-618.

The segregation of solute on a microscopic scale during crystal growth leads to the introduction of dislocation lines into the crystal at the bounding surfaces of the segregate. A layer type of segregate resulting from platelet growth leads to dislocation densities of 10^0 to 10^8 lines per sq. cm. A cellular type of segregation resulting from cellular or dendritic growth leads to dislocation densities of 10^6 to 10^8 lines per sq. cm. in the crystal. 29 ref. (M26b, N12)

309-M.* Orientation Study of Ultra-Thin Molybdenum Permalloy Tape. P. K. Koh. *Journal of Applied Physics,* v. 29, Apr. 1958, p. 636-657.

Quantitative pole density stereograms of (111), (220), (200) and (113) poles of 1/8-mil Mo Permalloy tape were developed to establish its cold rolled deformation texture and annealed textures. (M26c, M23c, P16a, 2-64, 3-68; Fe, Ni, *Mo,* SGA-n)

310-M.* X-Ray Investigation of Perfection in Tin Whiskers. H. G. Smith and R. E. Rundle. *Journal of Applied Physics,* v. 29, Apr. 1958, p. 679-683.

Tin whiskers with elasticities far above that of bulk Sn were examined for perfection by X-ray diffraction. Intensities were measured for several whiskers varying in diameter from 2 to 11μ. The observed structure factors were corrected for extinction according to the dynamical theory of X-ray diffraction with the crystallite size as a parameter and then compared to the calculated structure factors. The agreement

with dynamical theory for imperfect crystals is very good, yielding a crystallite size of 1.5μ for a 5.5μ whisker and 2.7μ for whiskers of about 10μ in diameter. (M26n, M22g; Sn, 14-61)

311-M. Evidence of Dislocation Jogs in Deformed Silicon. William C. Dash. *Journal of Applied Physics,* v. 29, Apr. 1958, p. 705-709.

(M26b, 3-68; Si)

312-M.* Polygonization of Copper. F. W. Young. *Journal of Applied Physics,* v. 29, May 1958, p. 760-764.

Dislocations can be revealed as etch pits in Cu crystals doped with a small amount of Te. The progress of polygonization of such Cu after bending was followed with etch pits and X-ray diffraction. Climbing occurred at 500° C. and polygonization was complete after 2 hr. at 1000° C. In similar experiments with three samples of nominally 99.999% Cu, the one which was probably purest did not polygonize, while the other two did so. This indicates that if impurity is necessary for polygonization, only a very small amount is required. (M26n, M26b; Cu-a)

313-M. Structures of Metals and Alloys. Norman C. Baenziger. *Norelco Reporter,* July 10-17, 1957, p. 58, 72.

10 ref. (M25, M26)

314-M. Electron Diffraction Study of the Epitaxial Growth of Silver Deposited on Some Single Crystals. A. Pande. *Scientific and Industrial Research, Journal,* v. 17B, Jan. 1958, p. 1-5.

17 ref. (M22h, N3r; Ag, 14-62)

315-M.* Dilational Strain Due to Lattice Defects in Copper. Robert W. Keyes. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report,* Pt. 3, Mar. 1958, p. 53-57.

Determination of the lattice expansion per defect from certain simple models of the defects: numerical results for copper; estimation of the parameters of lattice defects. 8 ref. (M26s; Cu)

316-M. Structure of Thallium and Gadolinium at Low Temperatures. C. S. Barrett. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report,* Pt. 10, Mar. 1958, p. 131-133.

7 ref. (M27, 2-63; Tl, Gd)

317-M.* (English.) The Deformation Texture of Beta-Sn. Pt. 3. Derivation of Texture From Elements of Plastic Deformation. Karel Toman and Marie Simerska. *Czechoslovak Journal of Physics,* v. 8, 1958, p. 233-245.

Theoretical derivation of compression and rolling textures in beta tin for two different sets of slip systems given in the literature. The textures derived theoretically were compared with the compression and rolling textures measured. The dependence of the texture produced on the temperature of deformation is explained. 14 ref. (M26c, Q24a; Sn)

318-M. (English.) Crystal Structure Changes in the Tau-Phase of Aluminum-Copper-Nickel Alloys. S. S. Lu and T. Chang. *Scientia Sinica,* v. 6, June 1957, p. 431-462.

13 ref. (M26; Al, *Cu, Ni*)

319-M. Influence of Ultrasonic Waves in Investigating the Structure of Steels. L. G. Merkurlov. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 1282-1286. (Translation by American Institute of Physics, Inc.)

Ultrasonic waves can be successfully utilized not only for the purposes of determining defects in metals but also for studying the structure of metals: this includes, for example, the discovery of untempered structures in steels, the determination of the forging quality of parts, the measurement of the average grain size, etc. (M23, 1-74)

320-M. Influence of Extinction on the Intensity of X-Ray Interferences in the Investigation of Steel. E. L. Galperin and Yu. S. Terminasov. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 1276-1281. (Translation by American Institute of Physics, Inc.)

19 ref. (M21f, M26b; ST)

321-M. Crystallography of Germanium. G. Novak. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 1544-1552. (Translation by American Institute of Physics, Inc.)

Goniometric examination gives a simple and rapid method of determining the orientation of germanium crystals from their external morphological features. Attempt to explain the tendency of single crystals and bicrystals of Ge to oriented growth in the Rubes contact method. 19 ref. (M26c, N3r; Ge)

322-M.* (German.) Contribution on Binary Systems of Titanium With

Gallium, Indium and Germanium and of Zirconium With Gallium and Indium. Kurt Anderko. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 165-172.

Arc melting of alloys. Metallographic and radiographic studies. Preliminary phase diagrams of Ti-rich alloys of Ga and In. Estimation of structure of phase Zr_5Ga_3.
(M24b; Ti, *In, Ge,* Zr, *Ga*)

323-M.* (German.) **Superstructure Phase of CsCl-Type in System Titanium - Molybdenum - Aluminum.** Horst Böhm and Karl Löhberg. *Zeitschrift für Metallkunde,* v. 29, Apr. 1958, p. 173-178.

Equilibria at 1000°. Description of the superstructure. Experiments on Ti alloys in which Mo was replaced by Cb or Ta and Al by Ga. Possible mechanism of superstructure formation.
(M24c; Ti, *Mo, Al, Cb, Ta, Ga*)

324-M.* (German.) **Ternary System Titanium-Vanadium-Zirconium.** Alexej Nowikow and Hans Günter Baer. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 195-199.

Construction of isothermal section at 750° C. by the aid of metallographic and radiographic study. Marginal systems. Experimental method. Course of transformation in ternary system. Phase diagrams.
(M24c; Ti, *V, Zr*)

325-M.* **Note on a Redetermination of the Aluminum-Gallium Equilibrium Diagram.** J. W. H. Clare. *Institute of Metals, Journal,* v. 86, May 1958, p. 431-432.

Thermal analysis was used to establish the form of the diagram. The system was found to consist of a simple eutectic with a eutectic temperature of 26.6° C.; the eutectic composition was not established. Metallographic and X-ray examination confirmed the existence of only two phases—Al and Ga. A tentative solidus was established down to 300° C. by a metallographic examination of annealed and quenched alloys. 4 ref. (M24b; Al, Ga)

326-M.* **Use of Thermal Expansion Measurements to Detect Lattice Vacancies Near the Melting Point of Pure Lead and Aluminum.** R. Feder and A. S. Nowick. *Physical Review,* v. 109, Mar. 15, 1958, p. 1959-1963.

Dilatometric and X-ray measurements of thermal expansion. For lead, results obtained by the two techniques agree within experimental error, which is interpreted to imply that the vacancy concentration at the melting point is 1.5×10^{-4}. For aluminum, dilatometric expansion appears to be slightly greater than X-ray expansion. If this discrepancy is real, it corresponds to a vacancy concentration at the melting point of Al of about 3×10^{-4}. The corresponding estimate for the formation energy of a vacancy in lead is 0.53 ev, and in Al, 0.77 ev. 26 ref.
(M26s, M21f, M23b, P11g; Pb-a, Al-a)

327-M.* **The Crystallographic Aspect of the Mechanical Twinning in Ti and Alpha-U.** Hiroshi Kiho. *Physical Society of Japan, Journal,* v. 13, Mar. 1958, p. 269-272.

It was found that {1122} and {1124} twins in Ti are reciprocal to each other and that the elements of {1121} twin are in agreement with Hall's result. 10 ref.
(M26c, Q24b; Ti, U)

328-M.* **Magnetic Effects on the Electron Diffraction Patterns From a Cobalt Crystal.** M. Blackman and E. Grunbaum. *Physical Society, Proceedings,* v. 71, May 1, 1958, p. 758-760.

Electron diffraction patterns taken on the prism face to a cobalt crystal showed a distortion due to the magnetic leakage field. The normal diffraction spots were replaced by a series of areas. When the primary beam was moved parallel to the edge of the crystal, the distorted pattern changed with a period characteristic of the domain spacing. On heating the crystal the magnitude of the distortion decreased, and became negligible at about 250° C.
(M22h, M26n, P16; Co)

329-M.* (French.) **Metallographic Study of Nickel and Nickel Alloys by Means of Local Polishing and Replica Techniques.** Pierre A. Jacquet. *Revue du Nickel,* v. 24, Jan-Feb-Mar. 1958, p. 1-10.

Use of electrolytic buffer for local polishing and etching, plus replicas such as made with nitrocellulose product called "Replic" (either plain or with sprayed-on aluminum film which provides greater reflective power), greatly facilitates nondestructive testing of parts at all stages of fabrication, as well as laboratory specimens. Results on Cr-Ni stainless steels and heat resistant alloys, Monel, annealed 70-30

cupro-nickel, nickel-clad steel and Nimonic alloys. 15 ref.
(M20; Ni, SS)

330-M. (Japanese.) **Electrolytic Polishing of Aluminum and Aluminum-Copper Alloy for Investigation of Microstructures.** Takuichi Morinaga, Yoshikazu Hosoi and Eiichi Sawato. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 9-13.

(M27, M20p; Al, *Cu*)

331-M.* (Japanese.) **Effect of Manganese and Chromium on the Characteristics of Aluminum-Magnesium (3-5%) Alloys. Pt. 4.** Rihei Kawachi. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 34-43.

Mechanical properties and macrostructure of Al alloy with 3 to 5% Mg, 0 to 0.75% Mn and 0 to 0.5% Cr, extruded at 1000 tons pressure to 4x40x40-mm. angle section. Mn and Cr bring about fibrous structure in the section; tensile properties are influenced by amount of fibrous structure and grain size; Mn, Mg, Cr increase strength; Mn and Cr decrease elongation. Properties may be considerably influenced by extruding temperature and preheating of ingot.
(M27, Q27, 2-60; Al, *Mn, Mg, Cr*)

332-M. (Russian.) **Properties of Atoms in Alloys of Transition Elements.** I. Ya. Dekhtyar. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 17-22.

Investigation of the magnetic characteristics of alloys of transition elements appears to be one of the methods for learning their electronic structure. Macroscopic values are obtained, but the characteristics of individual atoms cannot be determined by this method. Neutronographic analysis yields information on the structure of the electronic envelope of single atoms by evaluating disseminated neutrons. This mathematical consideration suggests further study by other means. 9 ref. (M25, P16)

333-M. An Investigation of the Me_5Si_3-MeSi Region of the Mn-Fe-Si and Some Related Systems. Bertil Aronsson. *Acta Chemica Scandinavica*, v. 12, no. 2, 1958, p. 308-313.

22 ref. (M24c, M22g)

334-M.* Studies of Aluminum-Rich Alloys With the Transition Metals Manganese and Tungsten. Pt. 1. The Crystal Structure of ε(W-Al)-WAl_4. J. A. Bland and D. Clark. *Acta Crystallographica*, v. 11, Apr. 10, 1958, p. 231-236.

The crystal structure of WAl_4 has been determined with moderate accuracy. The space-group symmetry was found to be Cm, and precision lattice parameters were measured. The heavy atom technique was used to find the approximate structure, and F_o syntheses were used in the refinement. The atomic arrangement is non-centrosymmetrical. 10 ref. (M26q; Al, *Mn, W*)

335-M. Studies of Aluminum-Rich Alloys With the Transition Metals Manganese and Tungsten. Pt. 2. The Crystal Structure of δ(Mn-Al)-Mn_4Al_{11}. J. A. Bland. *Acta Crystallographica*, v. 11, Apr. 10, 1958, p. 236-244.

Crystals of the triclinic alloy phase δ(Mn-Al) with an ideal formula $MnAl_{11}$ have been isolated from a ternary melt containing Zn. 19 ref. (M26q; Al, *Mn, W*)

336-M.* The Twist in a Crystal Whisker Containing a Dislocation. J. D. Eshelby. *Philosophical Magazine*, v. 3, May 1958, p. 440-447.

The twist due to a screw dislocation parallel to the axis of an isotropic cylinder of arbitrary cross section can be found from the solution of the ordinary torsion problem for the same cylinder. Some particular cases are worked out. Results are also valid for certain kinds of anisotropy. 13 ref.
(M26b; 14-61)

337-M.* Density Changes of Crystals Containing Dislocations. A. Seeger and P. Haasen. *Philosophical Magazine*, v. 3, May 1958, p. 470-475.

Zener's theory of the volume expansion of self-strained elastic bodies is applied to screw and edge dislocations in isotropic media. The important physical parameters entering are the pressure dependence of the shear modulus, and to a lesser extent, that of the bulk modulus. Numerical results for a number of materials. 13 ref. (M26b, P10a)

338-M. Chemical Bonding in Bismuth Telluride. J. R. Drabble and C. H. L. Goodman. *Physics and Chemistry of Solids*, v. 5, no. 1/2, 1958, p. 142-144.

7 ref. (M25h; Bi, Te)

339-M. The Structure of Metals as Seen Under the Microscope. Cyril

Stanley Smith. *Royal Institution of Great Britain, Proceedings,* v. 36, Pt. 2, no. 163, 1957, p. 404-416.

(M21)

340-M.* Etching of Germanium and Silicon. Pei Wang. *Sylvania Technologist,* v. 11, Apr. 1958, p. 50-58.

An oxidizing agent and a complexing agent are needed. By varying the etchant, the etching conditions and techniques, different surfaces can be obtained for various purposes. Chemistry of etched Ge surfaces and their relation to device characteristics. 43 ref.
(M20q; Ge, Si)

341-M. Uranium-Zirconium Alloys. *Soviet Journal of Atomic Energy,* v. 3, 1957, p. 957-958. (Translation by Consultants Bureau, Inc.)

Presence of ε-phase is firmly established in experiments on the diffusion of vapor from a U ingot placed in a Zr cylinder, carried out below the stability temperature of a solid solution of U in beta Zr. Metallographic evidence of the stability of the ε-phase was obtained by annealing a specimen (50% U by weight) of cold worked and recrystallized ε-phase in a furnace having a temperature gradient. 4 ref. (M24b; U, Zr)

342-M. X-Ray Study of the Elongation of Irradiated Uranium Rods. I. V. Batenin and B. V. Sharov. *Soviet Journal of Atomic Energy,* v. 3, no. 9, 1957, p. 1047-1049. (Translation by Consultants Bureau, Inc.)

CuKα radiation was used in apparatus for the roentgenography of highly radioactive materials. The specimens were rods of natural and 2% enriched U.
(M26c, P10d; U, 14-70)

343-M. Changes in X-Ray Line Intensities on Deforming Polycrystals. B. I. Smirnov. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 193-194. (Translation by American Institute of Physics, Inc.)

9 ref. (M21f, M26s)

344-M.* (Russian.) Investigation of the Effect of Mutual Orientation of Crystals on Fluidity in Intercrystalline Linking Phenomenon. V. I. Arkharov and A. A. Pen'tina. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 68-73.

Effect of internal adsorption and diffusion of impurities along individual grain boundaries. Intercrystalline linking and liberated energy depend on the character of mutual orientation. 19 ref.
(M27f, M26, 3-69)

345-M.* (Russian.) Radiographic Investigation of the Distribution of Carbon in Iron Alloys. A. S. Zav'yalov and B. I. Bruk. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 127-136.

Iron alloys containing Cr, Mn, Ni, Si and Mo were investigated using carbon^{14} to obtain autoradiographs. Method found reliable for determining the character of mutual bond between the distribution of carbon resulting from various heat treatment and the alloying elements. 18 ref. (M23q, 2-64; Fe-a, *C*)

346-M.* The Structure of Steel. Edwin Gregory and Eric N. Simons. *Edgar Allen News,* v. 37, Mar. 1958, p. 53-55.

Crystalline forms, grain size, structural forms and changes, impurities. (M26, M27; ST)

347-M. New Opinions on Grinding and Polishing, Especially of Metallographic Specimens. Z. Ministr. *Industrial Diamond Review,* v. 18, Feb. 1958, p. 26-28.

16 ref. (M20p)

348-M. Panoramic View of Microstructure Possible by New Technique. *Industrial Heating,* v. 25, June 1958, p. 1222, 1224.

Giant lantern slides from photomicrographs for study of refractories. (M21, M27, RM-h)

349-M. Three Methods of Specimen Preparation for Selected Area Electron Diffraction Examination of Metal Film Coated Ceramic Oxide Sub-Micron Particles. Arthur E. Lucier. *North Carolina State College, Engineering School Bulletin,* no. 64, Feb. 1958, p. 3-15.

5 ref. (M22h, 1-60; NM-f, 14-62)

350-M. Electron Diffraction From Crystals Containing Stacking Faults. Pt. 2. M. J. Whelan and P. B. Hirsch. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1303-1324.

Electron optical experiments on thin foils of stainless steel are in good agreement with theory. 7 ref. (M22h, M26s; SS, 4-56)

351-M. Indium-Rich Indium-Magnesium and Indium-Lithium Alloys. J. Graham and G. V. Raynor. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1354-1363.

For comparison with the results obtained from alloys of indium with solute metals from Group IIB of the periodic table, the lattice spacings of In-Mg and In-Li alloys are measured. 11 ref.
(M24b, M26; In, Mg, Li)

352-M. Band Structure of the Transition Metals. N. F. Mott and K. W. H. Stevens. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1364-1386.

45 ref. (M25, P15, P16; Cr, Fe, Co, Ni)

353-M.* The Theory of Small Angle Scattering From Dislocations. H. H. Atkinson and P. B. Hirsch. *Philosophical Magazine,* v. 3, Mar. 1958, p. 213-228.

Small angle scattering of X-rays or neutrons from crystals containing a random network of dislocations is calculated. Three causes of density changes associated with dislocations are: that due to the elastic strain field from edge dislocations, that due to second-order elasticity effects and that due to the dislocation cores. 17 ref.
(M26b, M22)

354-M. Measurement of Lattice Vibrations in Vanadium by Neutron Scattering. C. M. Eisenhauer, I. Pelah, D. J. Hughes and H. Palevsky. *Physical Review,* v. 109, Feb. 15, 1958, p. 1046-1051.

(M26; V)

355-M. X-Ray Study of Deutron-Irradiated Copper Near 10° K. R. O. Simmons and R. W. Balluffi. *Physical Review,* v. 109, Feb. 15, 1958, p. 1142-1152.

Measurements of lattice expansion using a rotating single crystal method. (M26, 2-67; Cu)

356-M. Phase Diagram of Bismuth to 130,000 Kg/Cm², 500° C. F. P. Bundy. *Physical Review,* v. 110, Apr. 15, 1958, 314-318.

(M24a; Bi)

357-M.* Electrical Methods for Determining the Positions of Dislocation Regions in Germanium. C. A. Hogarth and A. C. Baynham. *Physical Society Proceedings,* v. 71, Apr. 1, 1958, p. 647-653.

Walls of edge dislocations which exist in Ge crystals grown on a deformed seed are regions of high electrical conductivity in both n and p-type samples. By simple plotting of potential against distance at constant current or from point-contact rectification measurements the positions of such dislocation walls may be located, the results agreeing with the positions determined by etch pit examination of the surfaces at which dislocations emerge. Evidence of the p-type character of dislocations in n-type Ge is presented. 9 ref. (M26b, M23s; Ge)

358-M. Attempt to Determine Electron Configurations in Aluminum-Rich Alloys of Transition Metals. P. J. Black and W. H. Taylor. *Reviews of Modern Physics,* v. 30, Jan. 1958, p. 55-58.

6 ref. (M25m; Al-b)

359-M. Vibration Spectra of Vanadium and a Mn-Co Alloy by Neutron Spectrometry. A. T. Stewart and B. N. Brockhouse. *Reviews of Modern Physics,* v. 30, Jan. 1958, p. 250-255.

13 ref. (M22, P-general; Co, Mn, V)

360-M. Macrostructural Examination of Cast Uranium Bars. B. W. Mott and H. R. Haines. *United Kingdom Atomic Energy Authority Research Group,* AERE, M/R 509, 1958, 12 p.

Method of etching uranium sections to reveal the macrostructure; examination of sections from various cast bars 1.0 and 1.4 in. diameter. (M28p, M20q; U, 4-55)

361-M. Absorption and Diffusive Scattering of Ultrasonic Waves in Metals. L. G. Merkulov. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 953-957. (Translation by American Institute of Physics, Inc.)

Experimental investigations show that ultrasonic waves can be successfully employed for determining the average grain size in a metal. Method is based on measurement of the attenuation of ultrasonic waves. (M27c, 1-74)

362-M. Structure of Superconductors. Pt. 9. Investigation of Alloys of Bismuth With Platinum, Ruthenium, Osmium and Iridium. N. N. Zhuravlev and L. Kertes. *Soviet Physics JETP,* v. 5, Dec. 15, 1957, p. 1073-1078. (Translation by American Institute of Physics, Inc.)

The compound Bi_2Pt crystalizes in two modifications, alpha and beta. The appearance and disappearance of superconductivity may be explained by the presence of the beta high-temperature modification. Bismuth does not form compounds with ruthenium, osmium or iridium by direct alloying. 17 ref.
(M26q, P15g, 2-63; Bi, *Pt*)

363-M. Structure of Superconductors. Pt. 10. Thermal, Microscopic and X-Ray Investigation of the Bismuth-Palladium System. N. N. Zhuravlev. *Soviet Physics JETP*, v. 5, Dec. 15, 1957, p. 1064-1072. (Translation by American Institute of Physics, Inc.)

A more accurate determination of the phase composition of alloys containing 43-54% Pd; behavior of these alloys at low temperatures. 13 ref. (M24b, P15g; Bi, Pd)

364-M. Phase Diagram for Cerium. A. I. Likhter, Iu. N. Riabinin and L. F. Vereshchagin. *Soviet Physics JETP*, v. 6, Mar. 1958, p. 469-471. (Translation by American Institute of Physics, Inc.)

The p-T diagram of 99.8% pure cerium measured from −150 to +100° C. over a pressure interval up to 12,000 kg. per sq. cm. In the p-T plane the phase equilibrium line is a straight line whose slope is 43 kg. per sq. cm. per °C. The transition at atmospheric pressure and low temperature is the same as at room temperature and high pressure. 6 ref. (M24a, Ce-a)

365-M. Chemical Nature of the Ternary Intermetallic Phases in the Magnesium-Copper-Zinc and Magnesium-Copper-Nickel Systems. V. I. Mikheeva and G. G. Babavan. *Academp of Sciences of the USSR, Proceedings*, v. 109, July-Aug. 1956, p. 475-476. (Translation by Consultants Bureau, Inc.)

8 ref. (M24c; Cu, Mg, Ni, Zn)

366-M. (English.) **The Crystal Structure of Iridium Diselenide.** Luisa Brahde Barricelli. *Acta Crystallographica*, v. 11, Feb. 10, 1958, p. 75-79.

7 ref. (M26q; Ir, Se)

367-M.* (English.) **The Phase Diagram of Cu-Si-Zn Alloy.** Genjiro Mima and Masaharu Hasegawa. *Osaka University, Technology Reports*, v. 6, Oct. 1956, p. 313-321.

Reactions on solidification of the Cu-Si-Zn ternary alloys investigated by thermal analysis and microscopic observation; liquidus surface determined except near Si. 5 ref. (M24c; Cu, Si, Zn)

368-M. (Chinese.) **Ordering and Vacancy Diffusion in $AuCu_3$.** Sze Shih-Yuan. *Acta Physica Sinica*, v. 13, July 1957, p. 245-251.

11 ref. (M26b, M26c, N1e; Au, Cu)

369-M. (German.) **Examination of Metal Structures at High and Low Temperatures. Pt. 1-2.** Premysl Rys, Ladislav Bezdek, Karel Ciha, Dalibor Ruzicka and Jiri Skarek. *Acta Technica*, 1958, p. 58-83, and 85-119.

37 ref. (M21; ST)

370-M. (German.) **Investigation of Friction Pyrophoric Ti-Alloys; Ti_2Bi, a New Type of Structure.** Helga Auer-Welsbach, H. Nowotny and A. Kohl. *Monatshefte für Chemie*, v. 89, Mar. 21, 1958, p. 154-159.

(M24, M26q, Q9p; Ti-b)

371-M. (German.) **Disintegration Curve and Critical Point of the System Gold-Nickel.** A. Münster and K. Sagel. *Zeitschrift für Physikalische Chemie*, v. 14, Mar. 1958, p. 296-305. 24 ref. (M24b; Au-b, Ni-b)

372-M. (Rumanian.) **Application of Temperature Spectra as a New Method for the Study of Matter. Some Results for Iron and Steel.** Maria Bolgiu. *Studii si Cercetari de Metalurgie*, v. 2, no. 4, 1957, p. 415-424.

New method of thermodifferential analysis. The thermocouple junction in vacuum, taken as standard, is situated in the immediate neighborhood of the junction soldered to the specimen. The difference in temperature between the vacuum and specimen junctions is then determined only by specimen temperature variations. By optical recording and suitable amplification diagrams of the temperature difference as a function of the vacuum junction temperature, so-called "temperature spectra", are obtained that reveal the state of the specimen. 6 ref. (M23r; Fe, ST)

373-M. (Russian.) **Metallographic Study of Influence of Various Temperatures on Deformation of Aluminum Monocrystals.** L. I. Vasil'ev. *Scientia Sinica*, v. 7, Jan. 1958, p. 45-57.

17 ref. (M26s, Q24, 2-61; Al)

374-M.* **Etching of Germanium Crystals by Ion Bombardment.** G. K. Wehner. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 217-221.

Study of etch effects produced by sputtering Ge crystals and bicrystals under normal incident low-energy (100 ev) Hg + ion bombardment in a low pressure plasma (1 micron gas pressure). Surfaces show preferentially etched pits which readily reveal the crystal orientation. 17 ref. (M20q; Ge)

375-M.* Phase Analysis of Alnico V Based on Temperature Effects. R. K. Tenzer and K. J. Kronenberg. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 302-303.

A magnetic analysis of composition of the two Alnico V phases. Structure-independence properties like saturation magnetization and temperature coefficient serve to indicate the correctness of alloys supposed to represent these phases. Model of two-phase structure is derived from electron micrographs. The combined saturation magnetization and the combined temperature coefficients are calculated using the measured properties of the single alloys. The two alloys whose combined properties come closest to those of Alnico V consist mainly of NiAl and Fe_2Co, respectively. 6 ref. (M23a; Al, Ni, SGA-n)

376-M.* Neutron-Diffraction Observations on the Palladium-Hydrogen and Palladium-Deuterium Systems. J. E. Worsham, M. K. Wilkinson and C. G. Shull. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 303-310.

Neutron-diffraction investigations on powdered samples show that both hydrogen and deuterium atoms in beta-phase Pd-H and Pd-D are located in the octahedral positions of the Pd lattice. Results obtained for samples with low gas concentration are inconclusive in determining the atomic positions in the alpha phase, since at room temperature only a small amount of gas enters this phase. Although the vibrational amplitudes of hydrogen and deuterium are similar to those observed in other compounds, the total neutron-scattering cross-section for hydrogen in this system is abnormally low, indicating that the protons are more nearly free than in the other hydrogen compounds. 6 ref. (M24b, M22j; Pd, *H*)

377-M.* Examination of Sintered Aluminum Product Tubes. W. Evans. *Atomic Energy of Canada Ltd.,* CR MET-753, Mar. 1958, 15 p.

Metallographic examination of three samples of SAP tubing, two of Swiss origin and one of Alcoa M257 material. On annealing, the Swiss samples developed blisters. This is attributed to a high hydrogen content and its diffusion to an oxide-rich zone located near the outer surface of the tubes. The Alcoa M257 sample did not blister on annealing, and its microstructure was found to be satisfactory. (M27, 2-64, 9-71; Al, 6-70)

378-M.* (Japanese.) Change of Structure of Aluminum. Ikeno Takashi and Shibata Kizo. *Light Metals,* no. 30, May 1958, p. 11-14.

Change of structure due to heating at 450 and 600° C. of supercooled ingots of high-purity 99.99% Al and 1S and 2S Al alloys. Effect of heating on 1S and 2S ingots cast with tilting mold; relationship between the structure and surface pattern after rolling and anodic oxidation. (M27, 2-61, 3-68; Al)

379-M.* The Constitution of Alloys of Iron With Ruthenium, Rhodium, Palladium, and Silver. W. S. Gibson and W. Hume-Rothery. *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 243-250.

Iron-rich binary alloys with Ru, Rh, Pd and Ag investigated by thermal analysis in the temperature range 1380-1560° C. (M24b; Fe, Ru, Rh, Pd, Ag)

380-M.* (French.) Interpretation of Microphotographs of Fractures. J. Plateau, G. Henry and C. Crussard. *Métaux Corrosion-Industries,* no. 392, Apr. 1958, p. 141-162.

Features observed on the photographs, obtained with the electron microscope, of surfaces showing cleavage, tensile, or intergranular rupture, for various steels and nonferrous alloys. While photographs permit a better understanding of the mechanism of the rupture propagation, there remain features not readily interpretable because of the insufficiency of the relief, which is often very marked. Authors propose to remedy this by using a stereographic apparatus. 12 ref. (M21e, Q26)

381-M.* (French.) A Micrographic Examination of Irradiated Uranium. J. Bloch and J. Bourgues. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 339-344.

Initial results of study of uranium in first three sets of test bars removed from Saclay EL 2 pile. Under influence of irradiation U becomes markedly twinned and its hardness increases. In bars having given energies in excess of 200 MXj/t, U underwent profound changes in microstructure. Numerous fine twins are either curved or displaced through a shear phe-

nomenon; zones of recrystallization with fine, untwinned regular crystals are formed, these zones showing numerous fissures. 6 ref.
(M26s, 2-67; U)

382-M.* (German.) **Influence of the Degree of Purity, Casting Conditions and Deformation Temperatures Upon the Forming and Drawing Textures of Aluminum.** J. Grewen and G. Wasserman. *Metall,* v. 12, June 1958, p. 523-525.

The drawing textures of Al wires from continuous and mold castings are observed in relation to the degree of purity and fabrication temperature. On wires from continuous castings the double fiber texture <111> + <001> was always observed, the <111> portion increasing with lower purity and temperature. On wires from mold castings the tendency for the <111> position is favored and was often found exclusively. Tables for Al composition and percentages of fiber textures. 18 ref.
(M26c, 2-60, 2-61; Al, 4-61)

383-M.* **Intermetallic Compounds Between Lithium and Lead. Pt. 4. The Crystal Structure of $Li_{22}Pb_5$.** A. Zalkin and W. J. Ramsey. *Journal of Physical Chemistry,* v. 62, June 1958, p. 689-693.

The crystal structure of $Li_{22}Pb_5$ has been determined. The face-centered cubic cell contains 80 Pb atoms in space group F23; the cell constant is 20.08 A. The packing of the Li and Pb atoms is analogous to that found for LiPb, Li_3Pb_2, Li_3Pb and Li_7Pb_2; these structures resemble the body-centered cubic array present in Li metal, with the appropriate number of Li atoms replaced by Pb. 16 ref.
(M26q; Pb-b, Li)

384-M.* **Barium-Lithium Equilibrium System.** Douglas V. Keller, Frank A. Kanda and Alden J. King. *Journal of Physical Chemistry,* v. 62, June 1958, p. 732-733.

The X-ray diffraction pattern of $BaLi_4$ is in good agreement with a hexagonal cell having as its dimensions $a_0 = 10.92 \pm 0.01$ A. and $c_0 = 8.94 \pm 0.01$ A. with $c/a = 0.818$. The density was found to be 1.75 ± 0.05 g./cm^3 which requires a cell content of six molecules of $BaLi_4$. (M24b; Ba, Li)

385-M. Investigations on the Build-Up of the Sytsem Iron-Chromium-Carbon. Karl Bungardt, E. Kunze and Elizabeth Horn. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958 p. 193-203. (Iron and Steel Institute Translation no. 1019.)

Previously abstracted from original. See item 222-M 1958.
(M24c; Fe, Cr, C)

386-M.* (French.) **Notes on Properties of Copper Oxides Studied by Electron Diffraction.** J. Bougnot, J. Marucchi and N. Nifontoff. *Comptes Rendus,* v. 246, Apr. 28, 1958, p. 2484-2487.

Temperatures and modes of formation of CuO and Cu_2O and of subsequent decomposition in vacuum, as temperature increased, of resulting oxide films. 5 ref.
(M26r, M22h, R1h; Cu)

387-M.* (French.) **Mechanism of Formation of Banded Structures.** Paul G. Bastien. *Technique Moderne,* v. 50, Apr. 1958, p. 121-130.

Banded structure in steels is manifestation of chemical heterogeneity resulting from dendritic segregation during solidification of ingot. Any element introduced into solid solution which provokes displacement of A_3 point of steel is capable of promoting a banded structure. Phosphorus and other impurities, particularly As and Sn, play important role in formation of such structures in carbon and low-alloy steels. 42 ref.
(M28h, N12b; ST)

388-M. Structures of Iron and Chromium Deposited on Copper Single Crystals. A. Goswami. *Faraday Society, Transactions,* v. 54, June 1958, p. 821-825.

An electron diffraction study on the growth of Fe and Cr electrodeposited on Cu (110), (100) and (111) faces. 24 ref.
(M26n, M22h; Fe, Cr, Cu)

389-M. Small Angle Scattering From Cold Worked and Fatigued Metals. H. H. Atkinson. *Philosophical Magazine,* v. 3, May 1958, p. 476-488.

Small angle scattering of X-rays from polycrystalline Cu and single grains of Al deformed by cold work and fatigued by pulsating tension. 15 ref. (M26, M22g, Q24, Q7; Cu, Al)

390-M. Structure of Thallium and Gadolinium at Low Temperatures. C. S. Barrett. *Physical Review,* v. 110, June 1, 1958, p. 1071-1072.

X-ray diffraction at temperatures from 300 to 5° K. is employed to search for a low-temperature transformation in Th. The close-packed hexagonal structure of Gd was found

to be stable to 5° K.
(M26, 2-63; Gd, Th)

391-M. (Chinese.) **Investigation of Ag-Au-Zn Alloys With 50 At.% Zn.** Liu Yi-Huan and Hsu Chen-Chia. *Acta Physica Sinica*, v. 13, Nov. 1957, p. 453-482.

A beta" superlattice structure, with the ideal stoichiometrical formula, $AgAuZn_2$, and isomorphous with that of Heusler alloys, has been found existing over a quite wide range of composition. Its formation is accompanied by a sudden lattice contraction. The effect of gradual substitution of Ag by Au on the atomic distribution is studied systematically. (M24c; Ag, An, Zn)

392-M. (French.) **Trace Elements and Metallography.** Albert Portevin. *Fonderie Belge*, v. 28, May 1958, p. 147-153.

(M-general, 9-51)

393-M.* (German.) **Microcinematography of Transformation Processes in Metals.** F. Gabler and R. Mitsche. *Metall*, v. 12, May 1958, p. 362-365.

Microcinematography of metallurgical transformation permits observation of structural processes while happening. A comparatively simple apparatus was developed avoiding a vacuum chamber. Films of steel with 2% C and 4-6% Cr show the growth of martensite crystals. The velocity of growth was found to be between 10 and 100 microns per sec. 57 ref.
(M21g, X5j, N8)

394-M. (German.) **Investigations on the Systems V-B, Nb-B, V-B-Si, and Ta-B-Si.** H. Kudielka, H. Nowotny and G. Findeisen. *Monatschefte für Chemie*, v. 88, Jan. 28, 1958, p. 1048-1055.

14 ref.
(M24b, M24c; V, Cb, Si, Ta, B)

395-M.* (German.) **Pearlite and Bainite Structures Found in Three Carbon Steels Containing 0.18, 0.50, and 0.86% C.** Sten Modin. *Neue Hütte*, v. 3, Apr. 1958, p. 235-238.

Specimens 0.8 mm. thick were held for 10 min. at 1100° C. Isothermal transformation was performed in a metal bath after which the specimens were quenched in 5% NaOH. Specimens were then ground, polished and etched, and lacquer prints were taken with a solution of "Formvar" and "Mowital". The resulting structures showing both pearlite and bainite were examined under an electron microscope.
(M21e, N8h, N8m; CN)

396-M. (German.) **Reaction Equilibria Between Liquid Lead and Metal Oxides. Pt. 2.** Erich Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, June 1958, p. 247-252.

The reaction equilibria of the systems lead-bismuth-oxygen, lead-copper-oxygen, lead-tellurium-oxygen. 12 tables. (M24c; Pb, Bi, Cu, Te, O)

397-M. (Italian.) **Influence of Casting Conditions and of Fe/Si Ratio on the Structure of the Aluminum Alloy AP 5 and Its Mechanical and Deep-Drawing Characteristics.** D. Gaulandi and L. Mori. *Alluminio*, v. 27, May 1958, p. 213-223.

Influence of type of casting, the Fe/Si ratio, and heat treatment conditions on the micro and macrostructure, mechanical and deep drawing characteristics of semifinished products. 10 ref. (M27, M28, Q-general, E-general, 2-64, Al, *Fe, Si*)

398-M. Indium-Selenium System. J. C. Brice, P. C. Newman and H. C. Wright. *British Journal of Applied Physics*, v. 9, Mar. 1958, p. 110-111.

Polycrystalline specimens of In_2Se_3, InSe and In_2Se_2 were prepared by direct fusion. Electrical and physical measurements indicated a phase change in In_2Se_3 at 196° C. 10 ref. (M24b; In, Se)

399-M. Metallochemistry and Some of Its Problems. I. I. Kornilov. *Bulletin of the Academy of Sciences of the USSR*, v. 4, 1957, p. 409-417.

Interactions between atoms which result in solid solutions and metallic compounds. 50 ref.
(M25, M26p, M26q)

400-M. Plasticity of Solids Explored by New Technique. John J. Gilman. *General Electric Review*, July 1958, p. 9-12.

Basic explanation of elastic and plastic crystal deformation and examination by means of etch pits. (M26b)

401-M. Annealing Twins in Zone-Refined Lead and Lead-Silver Alloys. G. F. Bolling and W. C. Winegard. *Institute of Metals, Journal*, v. 86, July 1958, p. 492-496.

Determination of relative interfacial free energy of coherent twin boundaries in zone-refined Pb and Pb-Ag alloys; frequency of twinning. 18 ref. (M27e, P13h; Pb, *Ag*)

402-M. Single Crystal Lattice Rotation During Compression. R. L. Fleischer. *Journal of the Mechanics and Physics of Solids*, v. 6, July 1958, p. 301-306.

It is shown that lattice rotation during compression of a single crystal can be the reverse of that observed in tension rather than slip-plane rotation. 8 ref. (M26; 14-61)

403-M. Electronic Structure of Bismuth Type Crystal. Shoichi Mase. *Physical Society of Japan, Journal,* v. 13, May 1958, p. 434-445.

15 ref. (M25; Bi)

404-M. (English.) **Polishing With Diamond—a Quick and Inexpensive Metallographic Polishing Method.** Erik Rasmussen. *Ingenioren* v. 1, Oct. 1957, p. 68-72.

(M20p; NM-k37)

405-M. (English.) **An Investigation of Ag-Au-Zn Alloys With 50 At. % Zn.** Liu Yi-Huan and Hsu Chen-chia. *Scientia Sinica,* v. 6, Dec. 1957, p. 1013-1030.

11 ref. (M24c; Ag, Au, Zn)

406-M. (French.) **Influence of the Crystal Orientation of the Surface of Ferro-Chromium Alloys on the Formation of the Equilibrium Profile at High Temperatures.** Jean Moreau. *Comptes Rendus,* v. 246, Apr. 28, 1958, p. 2476-2479.

(M26c, 2-62; Fe, Cr, AD-n)

407-M. (German.) **Structure of Metal-Rich Phase of V, Cb, and Ta Borides.** H. Nowotny and A. Wittmann. *Monatshefte für Chemie,* v. 89, May 31, 1958, p. 220-224.

4 ref. (M26r; B, Cb, Ta, V)

408-M. (Russian.) **Theory of Dispersion of X-Rays With Ternary Alloys.** M. A. Krivoglaz. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 203-211.

Investigation of dispersal of X-rays on fluctuating concentration of components of ternary ordered alloys. Formula for determination of relationship between intensity of dispersal of monochromatic radiation of monocrystals, and the angle of radiation, orientation of monocrystals, composition of the alloys, annealing temperature and constant of interatomic interaction. 6 ref. (M21f, M27)

409-M.* (Russian.) **Domain Structure of Highly Coercive Alloys of Manganese-Bismuth.** Ya. S. Shur, E. V. Shtol'ts and L. V. Bulatova. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 234-240.

By means of X-ray powder method study was made of domain structure of MnBi alloy and its changes under influence of magnetic field. The process of magnetic reversal may be dependent on the original state of magnetization. It was possible, for the first time, to visually study the magnetic reversal of various crystals by the process of rotation. Investigation proved that MnBi alloys, consisting of 15 to 20-micron crystals, are separated from one another by nonferromagnetic interlayers. 8 ref. (M27g, P16c; Bi, Mn)

410-M. (Russian.) **Condition of Surface Layer of Zinc Monocrystals After Grinding and Tempering.** I. A. Gindin and V. S. Kogan. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 326-330.

7 ref. (M26, 3-68; Zn)

411-M. (Russian.) **Metallographic Study of Effect of Deformation at Different Temperatures on Aluminum Monocrystals.** L. I. Vasel'ev. *Scientia Sinica,* v. 7, Jan. 1958, p. 45-57.

17 ref. (M24, 2-61, 3-68; Al-a)

412-M. (Russian.) **Radiographic Study of Mosaic Metal Structure.** Ya. S. Umanskii and L. Kh. Pivovarov. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 549-554.

Review. 48 ref. (M21f, M26)

413-M. (Russian.) **Noncalibrated X-Ray Determination of Cubic Lattice Phases of Large Grain Objects.** Yu. A. Bagaryatskii and Yu. D. Tyapkin. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 554-561.

8 ref. (M21f, M26)

414-M. (Russian.) **Analysis of Atomic Structure in Metals and Alloys.** B. G. Lyashchenko. *Zavodskaya Laboratoriya, v.* 24, May 1958, p. 585-597.

41 ref. (M25)

415-M. (Russian.) **Present Status and Perspectives in Use of Electronographic Method for Investigation of Metals.** Z. G. Pinsker. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 597-604.

Review. 45 ref. (M23s)

416-M. (Russian.) **Conference on Use of Radioactive Isotopes in Ferrous Metallurgy.** V. I. Malkin. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 783-784.

(M23q, S19; Fe)

417-M.* **Etch Pits in Aluminum.** Zenji Nishiyama and Hiroshi Fujita. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 113-128.

Etch pits in Al observed mainly by electron microscope. The pit originates at an etching germ and grows by etching with three composite (100) planes intersecting at the germ. At the beginning of formation it has the form of a circular cavity, but when it becomes larger than several hundred Å in size is angular so that the geometrical type of the pit can be distinguished. In most cases the origin of the germ seems to be the edge dislocation accompanied with the atmosphere of solute atoms, and the etching progress leaves fine contour lines around the germ. 9 ref. (M20q, M21e; Al)

418-M.* The Crystal Structures of Plutonium—the Delta and Epsilon Phases. J. G. Ball, P. Greenfield, P. G. Mardon and J. A. L. Robertson. *United Kingdom Atomic Energy Authority, AERE M/R 2416,* 1958, p. 1-10.

Experimental procedure for obtaining X-ray diffraction photographs from Pu metal between room temperature and 530° C. Data for diffraction lines of two of the high-temperature phases, interpretations of the structures. (M22g; Pu)

419-M. The Structure of Steel. Pt. 7. Microscopic Structure. Edwin Gregory and Eric N. Simons. *Edgar Allen News,* v. 37, July 1958, p. 150-151.

(M27; ST)

420-M. On the Martensite Crystal: Electron-Microscopic Study of Etch Pits. Zenji Nishiyama and Ken'ichi Shimizu. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 105-111.

(M26c, M21e; ST)

421-M. (German.) **Metallographic Etching Tests With Germanium Single Crystals.** Zdenek Dragoun, Oldrich Zahejsky and Emil Sipek. *Bergakademie,* Mar. 1958, p. 205-209.

(M20q; Ge, 14-61)

422-M. (Book.) **The Solid State for Engineers.** Maurice J. Sinnott. 522 p. 1958. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $12.50.

(M-general, P-general, Q-general)

423-M. Investigation of Alloys of Magnesium and Their Properties. Pt. 3. Development of Preferred Orientation in Wrought Magnesium Alloys. S. L. Couling. Dow Chemical Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131437, Sept. 1957, 33 p. $1.

A polarized-light metallographic technique capable of supplying information on the orientation of individual grains in a polycrystalline magnesium aggregate was developed and used in several orientation studies. Distribution of preferentially oriented grains in various extruded alloys. Elongated clusters of grains of one orientation alternate with clusters of another orientation throughout much of the extrusion thickness. Imhomogeneous flow or "banding" was found to be an important deformation mechanism during cold rolling of certain alloys and hot compression of alloy cylinders. (M26c, 2-64; Mg-6)

424-M. On the Compound Ni_2B in Nickel-Boron Alloys. N. I. Blok, M. N. Kozlova, M. F. Lashko and K. Ya. Shpunt. *Academy of Sciences of the USSR, Proceedings,* v. 114, 1957, p. 309-311. (Translation by Consultants Bureau, Inc.)

Structure and phase composition of Ni-B alloys containing from 0.01 to 2.5% B. Metallographic investigation of the cast alloys revealed that along the grain boundaries there was formed a uniformly etched phase which constituted a eutectic mixture with Ni. The alloy with 2.5% B is pre-eutectic. This phase has been isolated both chemically and by electrolysis. 4 ref. (M27; Ni, B)

425-M.* Point Defects in Platinum. G. R. Piercy. *Atomic Energy of Canada Limited,* CRMet 782, 68 p.

Mobility and type of point defect introduced in platinum by deformation in liquid nitrogen, quenching into water from 1600° C., or reactor irradiation at 50° C. In all cases the activation energy for motion of the defects was determined from measurements of electrical resistivity. Measurements of density, hardness, and X-ray line broadening were also made. Experiments indicated that the principal defects remaining in Pt after irradiation and quenching are single vacant lattice sites and pairs of vacant lattice sites, respectively. 20 ref. (M26s; Pt)

426-M.* Some Observations on the Identification of Compounds in the System Uranium-Aluminum. R. F. Hills. *Institute of Metals, Journal,* v. 86, June 1958, p. 438-441.

Uranium-aluminum alloys containing more than 31.2% Al exhibit at

room temperature an equilibrium structure of (UAl_4 + Al), the amount of UAl_4 being dependent upon the composition of the alloy. Alloys in the range 25.4-31.2% Al should consist entirely of (UAl_3 + UAl_4) with no free Al. The formation of UAl_4 in both these regions can be suppressed by rapid cooling through the critical range.
(M24b; U, Al)

427-M.* A Redetermination of the Liquidus of the System Lead-Magnesium in the Range 0-3 Weight Per Cent. Magnesium. G. W. Horsley and J. T. Maskrey. *Institute of Metals, Journal,* v. 86, June 1958, p. 446-448.

Determination was carried out by thermal, metallographic and chemical analysis. The composition of the eutectic lies between 2.25 and 2.30% Mg and its melting point is estimated to be 248.5 ± 0.25° C. 6 ref. (M24b; Pb, Mg)

428-M.* Oxygen Impurity in Silicon Single Crystals. A. Smakula and J. Kalnajs. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 46-49.

Comparison of the lattice constant and density of "pure" Si crystals and of oxygen-contaminated crystals favors the substitutional position of oxygen in the Si lattice rather than the interstitial. The spectral position and intensities of 15 infrared absorption bands for pure Si crystals are given. The bands shift slightly toward higher frequency at about −130° C., but no narrowing was detected. 25 ref.
(M26; Si, *O,* 14-61)

429-M.* Activation Energies for the Production and Migration of Vacancies in Platinum. A. Ascoli, M. Asdente, E. Germagnoli and A. Manara. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 59-64.

Increases in the resistivity of Pt wires due to quenching are measured, and the activation energy for the formation of vacancies is found to be 1.23 eV. The concentration of vacancies at the melting point is 10^{-4} to 10^{-3}. 12 ref.
(M26s, P13a; Pt)

430-M. Preparation of Arc-Melted Uranium Carbides. R. J. Gray, W. C. Thurber and C. K. H. DuBose. *Metal Progress,* v. 74, July 1958, p. 65-70.

Uranium carbides are promising materials for Al reactor fuel elements requiring high uranium investments, particularly for the Atoms-for-Peace Program, where the U^{235} enrichment is limited to 20% Al-U carbide fuel plates, fabricated by the picture-frame technique, retain their dimensional tolerance during heat treatment. Microstructures illustrated.
(M27d, M21, T11g, 17-57; U, 14-68)

431-M. Electron Microscope as a Metallurgical Tool. William MacFarlane. *Royal College of Science and Technology, Metallurgical Club, Journal,* no. 10, 1957-1958, p. 31-34.

9 ref. (M20r, M21e, 9-72; ST)

432-M. Phases of the Tungsten-Boron System. G. V. Samsonov. *Academy of Sciences, Proceedings,* v. 113, 1957, p. 417-419. (Translation by Consultants Bureau, Inc.)

11 ref. (M24b; W, B)

433-M.* (French.) Preparation of Uranium Monocarbide and Its Relation to the Carbides of Refractory Transition Metals. H. Nowotny, R. Kieffer and F. Beneslovsky. *Revue de Metallurgie,* v. 55, May 1958, p. 453-458.

The monocarbide of uranium is of interest as a fuel in reactors. Solid solutions with other refractory carbides of groups 4a and 6a of the periodic system are characterized by great stability. Specimens obtained by fritting under pressure and examined by X-ray. A complete series of solid solutions is found in the UC-ZrC, UC-TaC and UC-CbC systems. Uranium carbide is also a good solvent for other carbides, particularly for VC, but its solubility is small. 11 ref.
(M24c, T11g; U, C, Cb, Ta, Zr, 14-67)

434-M. (Russian.) Aluminum-Tantalum Systems. V. M. Glazov, M. V. Mal'tsev and Yu. D. Chistyakov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, 1956, p. 131-136.

Aluminum corner of the Al-Ta system investigated by microstructural, macrostructural, thermal and X-ray refraction methods. Alloys containing from 0.01 to 5.1% Ta were homogenized at 500° for one week and annealed in stages at temperatures from 200 to 630°, 40 hr. at each temperature. Dependence on alloy composition of the number of grains per sq.cm. of the surface of a macroscopic slide, of the microscopic hardness of the solid solution and the macroscopic hardness.
(M24b; Al, Ta)

435-M. (Russian.) **A Microscopic and X-Ray Study of Cobalt-Antimony Alloys.** N. N. Zhuravlev. *Kristallografiyal,* no. 5, 1956, p. 506-508.

Alloys up to 50 at.% Co were produced under an Ar atmosphere in quartz ampules. $CoSb_3$ has a b.c.c. unit cell with $a = 9.016 \pm 0.003$ kX; its structure belongs to one of two X-ray groups m_1 or m_3mF. The existence of the compounds CoSb and $CoSb_2$ was also established. Microhardness and specific gravity were measured for $CoSb_3$, $CoSb_2$ and CoSb.
(M26; Co, Sb)

436-M. (Ukrainian.) **Structure of a Liquid Bismuth-Tin Alloy.** O. S. Lashko. *Dopovidi Akademii Nauk Ukrains'koi S.S.R.,* 1957, p. 30-32.

From an X-ray study of liquid eutectic Bi-Sn alloy it was possible to construct monochromatic curves for the intensity of scattered radiation and curves for atomic distribution at 150 and 400°. At 150° the first maximum on the atomic-distribution curve occurs at 3.3 Å; at 400° it is displaced to 3.5 Å. Analysis of the curve points to the existence in the liquid alloy of small regions composed predominantly of atoms of one kind. At 150° the coordination number for Sn atoms is 10 and for Bi atoms 8.
(M25; Bi, Sn, 14-60)

437-M. (Ukrainian.) **Ternary Solid Solutions in the System Copper-Magnesium-Cadmium.** S. S. Cherkashin, P. I. Kripyakevich and D. P. Frankevich. *Dopovidi Akademii Nauk Ukrains'koi S.S.R.,* 1957, p. 33-37.

Alloys containing 10-66.7 at. % Cu were investigated by metallographic and X-ray methods. Ternary solid solutions are based on certain binary compounds in the systems Cu-Mg and Cu-Cd. The compound Cu_2Mg dissolves about 6 at.% Cd at 400°; at the same time the lattice parameter in the solid-solution field increases from 7.018 (for Cu_2Mg) to 7.040 ± 0.001 kX as a result of the replacement of the Cu atoms by Cd atoms, which have a larger size. The maximum solubility of Mg in the compound $CuCd_3$ is 48 at.%.
(M24c, Cu, Mg, Cd)

438-M.* **Direct Observation of Dislocations and Their Movement in Metal Foils.** P. B. Hirsch, R. W. Horne and M. J. Whelan. *Electron Microscopy, Proceedings of the Stockholm Conference,* Sept. 1956, p. 312-315.

Examination of dislocation structure (specifically Al) by transmission electron microscopy. 14 ref.
(M21e, M26b, M26n; Al)

439-M. **Phase Analysis of Alloys Using the Radioactive Tracer Method.** E. Z. Vintaikin, P. L. Gruzin, Yu. A. Klyachko and A. P. Shotov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 179-184. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Procedure for determining chromium content in Cr-steel carbides, using the artificially radioactive isotope Cr^{51}. Relative error is 5-6%. Method makes it possible to obtain data on kinetics of carbide formation in the tempering of hardened Cr steel. The increase in Cr concentration in the carbide follows a straight line when plotted against the logarithm of the annealing time. 8 ref.
(M23q, N8a; ST, Cr, 14-63)

440-M. **Thermodynamics of Crystal Lattices With Vacancies.** N. S. Fastov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 265-274. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Under the effect of heat motion a number of atoms leave their positions in the crystal lattice and pass into intermediate positions either on the surface of the crystal or in internal microporosities. The result of this motion is the appearance of vacant positions (vacancies or holes) in the crystalline lattice. 8 ref.
(M26s)

441-M. **X-Ray Determination of the Characteristic Temperature of Chromium, Nickel and Molybdenum.** V. A. Ilyina and V. V. Kritskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 275-276. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

The magnitude of interatomic binding forces in crystals is reflected by such constants as melting point, heat of sublimation, activation energy of self-diffusion and diffusion, characteristic temperature and elasticity modulus. These characteristics determine the materials capacity for maintaining regular crystalline

structure. The binding forces in Cr, Ni, Mo and Fe were determined by measuring the thermal factor of the intensity of X-ray interferences. The characteristic temperature was calculated from this factor. (M25h; Cr, Ni, Mo, Fe)

442-M. Investigation of the Variation of Intensity of X-Ray Interference Lines of Deformed Steel. V. A. Ilyina and V. K. Kritskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 294-298. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Influence of plastic deformation on crystalline lattice. The intensity of X-ray reflections is considerably lower from deformed metals than from undeformed metals. Measurements at two temperatures (+23° and −185°) showed that the change in intensity (thermal intensity coefficient) resulting from a 200° reduction in temperature of the specimen varies equally for both deformed and undeformed iron. 10 ref. (M26, M22g, Q24; ST)

443-M.* (Czech.) **Potentiostat in Metallography.** Vladimir Cihal, Milan Prazak and Miroslav Holinka. *Hutnicke Listy*, v. 13, 1958, p. 496-502.

Problems of metallographic etching under conditions of controlled potential. Proposes potential values for selective etching of ferrite sigma phase, austenite and austenitic grain boundaries in 18-8 on basis of characteristic polarization curves of the individual phases. 14 ref. (M20q, X25h; SS)

444-M. (Russian.) **Equilibrium Diagrams of Ternary System Ni-Cr-W.** I. I. Kornilov. *Zhurnal Neorganicheskoi Khimii*, no. 4, 1957, p. 860-867.

Alloys containing up to 50% Cr and 30% W were studied by thermal and X-ray methods and by microstructure analyses. Increase in Cr content decreases the temperature of the start of crystallization, and alloys containing more than 40% Cr crystallize at 1350° as eutectic mixtures. The solubility of Cr in the solid solution of Ni containing 30% W is considerably less than in alloys with 10% W at all temperatures. (M24c; Ni, Cr, W)

445-M. (Russian.) **Interaction of Titanium Carbide With Metals of Iron Group.** V. N. Yeremenko. *Zhurnal Neorganicheskoi Khimii*, no. 9, 1956, p. 2131-2148.

Systems TiC-M(Ni, Co, Fe) were studied by thermal, metallographic, dilatometric, durometric (hardness measurement) and X-ray methods, and diagrams in the metal-rich range were plotted. The systems are of the eutectic type with limited TiC solubility. In the system TiC-Ni, eutectic is at 1280° and 9.3% TiC; the solubility of TiC in Ni is 6.2% at this temperature and 2% at 700°. In the system TiC-Co, eutectic is at 1360° and 6% TiC. Solubility of TiC in Co drops from 1% at 1360° to 0.15% at 700°. In the system Ti-Fe, eutectic is at 1460° and 3.8% TiC. (M24c; Ti, Ni, Co, Fe, C)

446-M. X-Ray Investigation of Interatomic Reactions in Solid Solutions With a Nickel Base. G. V. Kurdyumov and N. T. Travina. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 277-280. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Materials studied consisted of binary solid solutions of Ni with Cr, Ti or Al or quaternary Ni-Cr-Ti-Al alloy with the second phase separating from it during the disintegration of the solid solution. For a given atomic concentration the greatest increase of the binding strength is caused by Ti, next by Al and the smallest by Cr. The simultaneous effect of these three elements leads to a greater increase of interatomic binding strength than the individual effect in binary solid solutions. (M25l; Ni-b, *Cr, Ti, Al*)

447-M. Effect of Chromium on the Binding Forces in α-Iron Crystals. V. K. Kritskaya, G. V. Kurdyumov and T. I. Stelletskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 281-283. (Available from U. S. Office of Technical Services, Washington, 25, D. C.)

Three Fe-Cr alloys containing 2, 8 and 16% Cr were investigated. The characteristic temperature and the variation of mean square deviation during thermal oscillations of atoms in the lattice of the solid solution were determined from the thermal factor of X-ray scattering by measuring the intensity of X-ray reflections at two different temperatures. (M25h, 2-60; Fe, *Cr*)

448-M. Binding Forces and Statistical Deformations in the Lattice of Alloyed Ferrite. V. A. Ilyina and V. K. Kritskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 284-288. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

To study the effect of alloying elements on the variation of binding forces in ferrite crystals and on the magnitude of the statistical deformations of the lattice of the solid solution, alloys containing small amounts (up to 2%) of Mo, Cb, Mn, Co and V, were used. Measurements showed that, with the exception of V, all the alloyed elements increase the binding forces in ferrite crystals. 5 ref.
(M25h, 2-60; Fe-b *Mo, Cb, Mn, Co, V*)

449-M. Quasi-Binary Nature of a System of a Six-Component Nickel-Base Solid Solution With Titanium Carbide. I. I. Kornilov. *Doklady Akademii Nauk SSSR*, v. 119, no. 3, 1958, p. 501-503. (Henry Brutcher, Altadena, Calif., Translation no. 4269.)

Simplifying study of multicomponent metallic systems by reducing them to equilibrium among a limited number of phases (e.g. three). Eight-component system Ni-Cr-W-Mo-Cb-Ti-Al-C phase diagram obtained.
(M24d; Ni, Cr, W, Mo, Cb, Ti, Al, C)

450-M. (Russian.) **Chemical Nature of Ternary Intermetallic Phases in Systems Magnesium-Copper-Zinc and Magnesium-Copper-Nickel.** V. I. Mikheyeva and G. G. Babayan. *Doklady Akademii Nauk SSSR*, no. 4, 1956, p. 785-786.

The existence of chemical compounds MgCuZn and MgCuNi was established by measuring the electric resistance and its temperature factor in the regions of homogeneity of the solid phase in the systems Mg-Cu-Zn and Mg-Cu-Ni. The solid phases of these systems may be considered as ternary berthollides—phases containing the above-mentioned compounds in the state of dissociation or in the state of change of component valence.
(M24c; Mg, Cu, Zr, Ni)

451-M. (Russian.) **X-Ray Diffraction of Compounds in the Bi-Rh and Bi-Pd Systems in Connection With Superconductivity.** N. N. Zhuravlev and G. S. Zhdanov. *Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya*, no. 6, 1956, p. 708-713.

Bi-Rh system contains three intermetallic compounds: Bi-Rh, Bi_2Rh and Bi_4Rh. For isolated crystals of these compounds, data are determined on their crystalline structure, and also certain physical properties, including the temperature of transition to the superconducting state. (M22g, M24b; Bi, Rh)

452-M. (Russian.) **Phase Diagram of Binary System Titanium-Aluminum.** I. I. Kornilov, Ye. N. Pylayeva and M. A. Volkova. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 7, 1956, p. 771-778.

Thermal, microstructure and X-ray diffraction methods, also analysis of hardness and heat resistance. Occurrence of peritectic transformations has been ascertained at 1520° (beta) + melt $\rightleftarrows$ gamma and at 1400° (gamma + melt $\rightleftarrows$ $TiAl_3$) and also a peritectoidal reaction at 1300° (beta + gamma $\rightleftarrows$ alpha). Solubility of Al in Ti at 1200° and 800° is, respectively, 26 and 21.6%.
(M24b; Al, Ti)

453-M. (Russian.) **Intermetallic Alloys of Platinum and Gold With Alkali and Alkaline-Earth Metals.** I. L. Sokol'skaya. *Zhurnal Tekhnicheskoi Fiziki*, no. 1, 1957, p. 127-129.

Study of specimens from the systems Na-Au, Na-Pt and Ba-Pt produced by heating a Au film in Na vapor by evaporating Pt in Na vapor, and by condensing Ba and Pt in a vacuum. The compound Na-Au proved to be a typical semiconductor with an exponential temperature dependence of resistance and an activation energy of 0.15 eV. In the systems Na-Pb and Ba-Pt, the existence of compounds could not be taken as fully demonstrated, though the experimental results support the assumption to a considerable extent.
(M24b, P15g; Na, Au, Pt, Ba)

454-M.* (French.) **Use of Bromine in Electron Metallography.** G. Henry, J. Pleatau and J. Philibert. *Comptes Rendus*, v. 246, May 12, 1958, p. 2753-2756.

Use of bromine as agent of dissolution of matrix of ferrous alloys, for preparation of direct carbon replicas; separation of replicas; methods of extraction, identification and analysis of precipitates and inclusions. (M20r, M21e)

455-M.* (Russian.) **X-Ray Study of Metallic Structure After Electro-Spark Treatment.** K. F. Starobudov and B. P. Kolesnik. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 434-441.

Study of phase changes and microhardness of surface layers of more than 100 combinations of V, Mn, Zr, Nb, C, Al, Fe, Ni, Cu, Zn, Cd, Sn, Pb and Bi, after electro-spark treatment. 9 ref.
(M21f, M27, G24a, Q29q)

456-M.* (French.) **Equilibrium Diagram of Uranium-Iron for Low Concentrations of Iron.** J. Bellot, A. Blanchon, R. Chazot, P. Dosiere, J. M. Henry and M. Colas. *Comptes Rendus,* v. 246, May 28, 1958, p. 3063-3065.

Study of U-Fe equilibrium diagram for alloys containing less than 0.3% Fe, with particular attention to curve of solubility of Fe in beta uranium. (M24b; U, Fe)

457-M. (Ukrainian.) **Revision of the Constitutional Diagram of the Iron-Arsenic System.** V. N. Svechnikov and A. K. Shurin. *Dopovidi Akademii Nauk Ukrains'koi S.S.R.,* no. 1, 1957, p. 27-29.

Study of Fe-As alloys containing 0.016-0.020% C and up to 12.6% As. Shape of liquidus and solidus curves and position of the two-phase (alpha + gamma) field establish that Fe-As alloys belong to the series with closed gamma-loop. The As contents of the gamma and alpha phases at the temperature of maximum solubility of As in ferrite (1150° C.) are 1.75% and 2.4% respectively. (M24b; Fe, As)

458-M. (Ukrainian.) **Study of a Polythermal Section of the Constitutional Diagram of the Ternary System Ti-Fe-C.** V. N. Eremenko, V. M. Bulanov and L. O. Gaevskaya. *Naukovi Zapiski Kievskogo Instituta,* no. 13, 1956, p. 119-124.

The TiC-Fe constitution diagram was studied in the region up to 16% TiC, by thermal, metallographic, dilatometric and X-ray structural analysis. The eutectic in the TiC-Fe system is at 1460° C. and 3.8% TiC. TiC increases the temperature of the gamma to alpha transformation in Fe, leading to the peritectoid reaction gamma (0.04% Ti) + TiC → alpha (0.15% TiC) at 920° C. Alloys containing more C than indicated in the ideal section TiC-Fe undergo eutectoid transformation at 695° C. Literature reviews on the systems Ti-Fe, Ti-C and TiC-Fe. 38 ref. (M24c; Ti, Fe, C)

459-M. Electropolishing and Electro-Etching of Microsections of Iron-Copper Powder Compacts. O. K. Teodorovich and E. T. Kachkovskaya. *Zavodskaya Laboratoriya,* v. 24, no. 1, 1958, p. 57-60. (Henry Brutcher, Altadena, Calif., Translation no. 4194.)

Previously abstracted from original. See item 223-M, 1958.
(M20p, M20q; 6-70)

460-M. (Czech.) **Electron Microscopy.** Ivan Hrivnak. *Hutnické Listy,* v. 13, 1958, p. 526-531.

Methods used in preparation of replicas of steel samples. Preparation of colloidion, polystyrene and carbon extraction replicas. Emphasizes electrolytic method of preparation in $HClO_4$ solutions. 12 ref. (M20r, M21e; ST)

461-M. (French.) **Structure of the Low-Temperature Au_2Mn Phase.** Pierre Michel. *Comptes Rendus,* v. 246, May 5, 1958, p. 2632-2635.

5 ref. (M26q; 14-68, Au, Mn)

462-M. Twinned Epitaxy of Copper on Copper. Theodore H. Orem. *National Bureau of Standards, Journal of Research,* v. 60, June 1958, p. 597-608.

Study of X-ray diffraction of Cu electrodeposited on various faces of Cu monocrystals. Electroplate in some cases followed orientation of base crystals. in others, twinning occurred. 10 ref.
(M26c, N12d; Cu, 8-62)

463-M. (Chinese.) **Diffraction of X-Rays From Aluminum Single Crystals While Under Tension.** Yui Zhui-Khuan, Li Yui-Tszi, Tsui Khuei-Tszun and Se Kuan-Tsun. *Acta Scientia Natura,* no. 2, 1956, p. 185-202.

Al single crystals stressed in tension to various degrees of strain were studied by the Laue method. The effect of stress on the crystal appears to a much greater degree on Laue photographs obtained by back-reflection. At the outset of the stress process the asterism of the Laue spots is increased but at greater stress, saturation sets in. In back-reflection Laue photographs, the Debye diffraction rings are clearly defined while in photographs taken in the transmitted beam these rings

are not observed even at stress of 70%. It is concluded that during stress the crystal undergoes regular rotation of the crystallites which form due to the stress.
(M22g; Al, 14-61)

464-M. (Russian.) **Existence of Sigma and Chi Phases in Rhenium Alloys.** Ya. Nemets and V. Tzhebvatovskii. *Byul. Pol'skoi Akademii Nauk,* Pt. 3-4, no. 9, 1956, p. 591-593.

X-ray study of binary alloys of Ré with Cb, Ta, Cr, Mo, and Fe. The alloys were prepared by sintering the pure components in a stream of pure H_2 or by melting in an arc furnace under an Ar atmosphere. Chi phases occur in the alloys with Cb and Ta. For the structural formula $Re_{22}Cb_7$, the positions of the atoms in the unit cell were verified on the assumption that they were equal to the co-ordinates of alpha-Mn. (M26; Re)

465-M. (Russian.) **Effect of Titanium on the Structure of Iron-Cobalt-Aluminum Alloys.** N. A. Galaktionova and F. B. Nikishova. *Fizika Metallov i Metallovedeniye,* no. 3, 1955, p. 506-509.

Investigation of the structure of Alnico-5 type alloys with addition of Ti (0.8-5%) after hardening (cooling from a temperature of 1300° in a magnetic field at the critical speed), in high-coercive state after tempering.
(M27d, 2-60; SGA-n, Fe, Co, Al, *Ti*)

466-M. (Russian.) **Use of X-Ray Structural Analysis in the Study of Some Problems of Deformation and Recrystallization Textures.** Yu. M. Loiko. *Sbornik Nauchnykh Trudov Fiziko-Tekhnicheskogo Instituta Akademii Nauk Byelorusskikh SSSR,* no. 3, 1956, p. 169-177.

Effect of temperature, degree and speed of deformation on the formation of deformation texture and recrystallization texture. Specimens of Ni, steel 45, Armco Fe, Fe-Ni-C alloys (20-80% Ni and 0.4% C), Cu and Al were tested at 50-100° C. intervals by compression under static and impact loading while at each temperature various degrees and speeds of deformation were used.
(M26c, 2-61, N5, Q24)

467-M. (Russian.) **Rhenium and Its Alloys.** Ye. M. Savitskiy and M. A. Tylkina. *Issledovaniya po Zharoprochnym Splavam. M., Akademii Nauk SSSR,* 1956, p. 33-47.

Properties of Re and its alloys with Mo (over the entire range of concentration) obtained by arc melting in an argon atmosphere. All specimens were subjected to metallographic and X-ray diffraction analysis and to a hardness measurement at temperatures of −194, 200, 400, 600, 800, 1000, and 1150° C. in an argon atmosphere; plasticity was determined at 20 and 1000° C.
(M24b, Q-general; Re, *Mo*)

468-M. (Russian.) **Investigation of the Palladium-Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleymonov, V. V. Kuprina and L. I. Rybak. *Zhurnal Neorganicheskoi Khimii,* no. 5, 1956, p. 1067-1073.

The mutual solubility of Cu and Co increases with increasing Pd contents. The heterogeneous region of the Cu-Co system is transformed into a triple system at room temperature, is gradually reduced with increasing content of Pd in the alloys and is closed at approximately 55% Pd. (M24c, Pd, Cu, Co)

469-M. Preferred Orientation of Cold-Rolled and Recrystallized Uranium Plate. W. R. McDonell. *U. S. Atomic Energy Commission DP-258,* 1958, 20 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.75.

Preferred orientation induced by mild cold rolling after beta transformation was characterized by measurement of thermal expansion coefficients. It was estimated that cold reductions of 5 and 10% would cause elongations of one and two per thousand MWD/T, respectively, during irradiation of the plate. Recrystallization following cold work did not significantly affect the preferred orientation, but relieved intergranular stresses in the metal. The cold work and recrystallization reduced the grain size of the metal.
(M26c; U, 4-53)

470-M. Preparation of Metallographic Specimens Through Vibratory Polishing. E. L. Long and R. J. Gray. *U. S. Atomic Energy Commission ORNL-2924,* 1958, 15 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

In contrast to the commercially available automatic polishers, vibratory polishing is a continuous process. As many as 24 specimens can be polished simultaneously and overpolishing is less likely to occur. (M20p)

471-M. (Russian.) **Investigation of the Structure of Magnesium Alloys Containing Calcium, Using Radiographic Methods.** M. Ye. Drits, Z. A. Sviderskaya and E. S. Kadaner. *Issledovaniya po Zharoprochnym Splavam. M., Akademii Nauk SSSR,* 1956, p. 84-90.

Investigation using Ca^{45} on macro and microstructures of Mg-Ca, Mg-Mn-Ca, Mg-Mn-Al-Ca alloys. Macrostructure indicates that crystallization has a dendrite character. Increasing Ca content increases the irregularity of its distribution in the alloy.
(M28h, M27, 1-59; Mg-b, *Ca*)

472-M. (Russian.) **Reaction of Titanium Carbide With Nickel.** V. N. Yeremenko, V. M. Polyakova and Z. P. Golubenko. *Sbornik Voprosy Poroshkovoy Metallurgii i Prochnosti Materialov,* v. 3, 1956, p. 62-72.

Thermal analysis, metallographic and radiographic methods were used in establishing the equilibrium diagram for the system Ni-TiC in the Ni-rich region. Solubility of TiC in Ni in the solid state was determined. (M24; Ni, Ti)

473-M. (Russian.) **Use of a Capacitative Dilatometer for Studying Phase Transformations in High Speed Heating.** I. N. Kidin and A. V. Panov. *Zavodskaya Laboratoriya,* v. 23, no. 1, 1957, p. 48-52.

Apparatus for recording dilatometric curves in the study of phase transformations in steels, by which changes in length of the heated specimen can be recorded over heating rates of from 1 to 10,000° C. per sec. Temperatures were measured with couples, spot welded to the specimen at 0.5 to 1.0-mm. intervals. (M23b, 1-53)

474-M. On the Influence of Intermolecular Interaction on the Behavior of Solutions. D. S. Kamenetskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 42-51. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Molecular interaction of the components in the solution materially affects the behavior of solutions; type of condition diagram, boiling and melting points, vapor pressure of components and the disposition of the components between the solvent phases or two contiguous solutions. 7 ref. (M25, P12; 14-67)

475-M. New Type of Preparation for Electro-Microscopic Investigation of Dispersed Structures of Two-phase Alloys. A. I. Rizol and L. M. Utevsky. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 205-210. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Replica preparation for phase analysis. (M21e, M24)

476-M. X-Ray Analysis of the Carbide Phase of Patented Steel Wire. V. M. Golubkov and V. K. Kritskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 322-325. (Available from U. S. Office of Technical Services, Washington 25, D. C.; also available as Henry Brutcher, Altadena, Calif., Translation no. 3950.)

Previously abstracted from original. See item 353-M, 1957.
(M26r, M22g; ST, 4-61)

477-M.* Dislocations in Stainless Steel. W. Bollmann. *Electron Microscopy, Proceedings of the Stockholm Conference,* Sept. 1956, p. 316-318.

Direct observation of dislocation movements in 18-8 Cr-Ni steel by electron microscopy techniques. 8 ref. (M26b, M22b; SS)

478M. On Texture in Iron Scale. Pt. 9. Electron Diffraction Investigation of Textures in the Haematite Layer at Different Stages of the Oxidation of Iron in Air. V. I. Arkarov and B. S. Borisov. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 58-64. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 371-M, 1957
(M26c, R1h; Fe, 9-52)

479-M. (Czech.) **Isolation of Carbides From Steel.** V. Toman, H. Tuma and N. Tietz. *Hutnicke Listy,* v. 11, no. 12, 1956, p. 738-740.

Preparation of the specimens, isolation and chemical analysis of the carbides, preservation of the carbides isolated and final analysis of the results. The shape and pretreatment of the specimens depend on the isolation method selected, but their surfaces must always be clean and edges rounded. Composition of, and method of using, electrolytes for anodic solution of the specimen; effects of electrolyte (composition), time and temperature on the analytical results. (M23, M26r; ST)

480-M. (Russian.) **Investigation of the Ni-S System From 30 to 50 At. %.** S. M. A. Sokolova. *Doklady Akademii Nauk SSSR,* v. 106, no. 2, 1956, p. 286-289.

The existence of the compound NiS in two forms is confirmed. Ni-rich alloys show metallic conductivity, while the alloys rich in S approach the semiconductor conductivity values. (M24b; Ni, S)

481-M. (Russian.) **Investigation of Alloys of the Palladium-Cobalt-Nickel System.** A. T. Grigor'yev, L. A. Pantelevmonov, Ye. M. Sokolovskaya, T. V. Bunina and M. V. Mastvugina. *Izvestiia Sektora Fiziko Khimicheskogo Analiza Institut Obschchei i Neorganicheskoi Khimii imeni Akademiia Nauk SSSR,* v. 27, 1956, p. 185-197.

Microstructure, hardness and electric resistance determined. Shape of liquidus and solidus curves of sections with constant Pd content and microstructure of the alloys indicate that the components of the ternary system Pd-Co-Ni form a continuous series of solid solutions. (M24c, M27, P15g, Q29n; Pd, Co, Ni)

482-M. (Russian.) **Equilibrium of Chemical Heterogeneity in Metallic Alloys at High Temperatures.** V. N. Svechnikov and B. A. Movchan. *Nauchnye Raboty Instituta Metallofiziki, Akademii Nauk Ukrainskoii SSR,* no. 7, 1956, p. 32-47.

Study of the distribution of W and Cr in steel KhVG in a condition of superheat by X-ray, microanalysis and autoradiography. Heating was carried to 1200, 1300 and 1400° C. and held for 30 min. in a protective atmosphere and under vacuum. After heating to 1400° C. the content of W at the surface of an intercrystalline fracture was more than twice the mean content of W in the steel. Micro X-ray analysis showed that the joints of the grains were enriched with Cr and W. Distribution of P in carbon steel, containing 0.04-0.25% C, by the process of homogenization was also studied.
(M27, 2-64, AY, *Ce, W, P*)

483-M.* (Russian.) **Formation of Texture During High-Temperature Annealing of Cold Rolled Transformer Steel.** G. N. Shubin and L. V. Mironov. *Stal',* v. 18, July 1958, p. 648-650.

Experimental confirmation of the significance of converging crystallization as a base for increasing the intensity of texture, and of the specific role played by secondary recrystallization, the parameters of which depend on heat treatment conditions of steel and determine the development of anisotropy of magnetic properties. On the basis of these experiments it is possible to recommend that to obtain steel of low anisotropic magnetic properties the annealing should be conducted very rapidly (200-250° C. per min.). (M26c, J23, P16; AY, SGA-n)

484-M. Electonic Structure of Nickel and Its Alloys. G. S. Krinchik. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 26-29. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 370-M, 1957.
(M25, P16; Ni)

485-M. (Russian.) **Calculating the Pattern of X-Ray Emission Spectrums of "Ordered" Alloys.** A. N. Orlov and A. V. Sokolov. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 390-394.

10 ref. (M22g)

486-M. (Book.) **Constitution of Binary Alloys.** Max Hansen and Kurt P. Anderko. 1305 p. 1957. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. $32.50.

Phase diagrams and crystal structure of metallic phases. (M24, M26)

487-M. Methods of Preparation and Examination of Surfaces. G. L. Bailey. Paper from "Effect of Surface on the Behaviour of Metals", Philosophical Library, 1958, p. 3-25.

For studying the shape, or topography, of surfaces; studying their structure, both on the microscopic and atomic scales; and determining the composition of surfaces. Application of electron microscopy, field emission microscopy and electron diffraction. 10 ref.
(M27, M25, S15, M21, M22)

488-M. Identity Period of the Lattice of Pure Vanadium and Effect of Oxygen on It. M. A. Gurevich and B. F. Ormont. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 88-90. (Translation by Pergamon Institute.)

A method of determining oxygen, dissolved in V, based on change it induces in the lattice constant, is proposed; figures tabulated for this change. 13 ref. (M26, S11g; V-a, *O*)

489-M.* (French.) **Quantitative Study of Dendritic Heterogeneity in Iron**

Alloys. Christian de Beaulieu and Jean Philibert. *Comptes Rendus,* v. 246, June 30, 1958, p. 3615-3618.

Variation of concentration between dendritic axes and interdendritic spaces observable by means of autoradiography can be determined quantitatively by pinhole studies made with Castaing micro-analyzer. It is then possible to standardize information obtained. In presence of carbon, elements are classified in following order of increasing heterogeneity: Mn, Cr, Mo, As.
(M27, N12b, M23q, Fe-a, *Mn, Cr, Mo, As*)

490-M.* (French.) **Superstructure in a Ti-Al 15% Alloy.** Adrien Saulnier and Maurice Croutzeilles. *Comptes Rendus,* v. 246, June 30, 1958, p. 3622-3625.

Electron micrographic and electron diffraction studies showed existence of an ordered compact hexagonal phase which is a Mg_3Cd type superlattice of the alpha solid solution. This phase appears in submicroscopic platelets parallel to faces $\{\bar{1}010\}$ of the solid solution. 5 ref.
(M27b; Ti-b)

491-M.* (French.) **Relationship Between the Purification of Aluminum and Its Susceptibility to Etching Reagents.** Gerard Wyon and Paul Lacombe. *Comptes Rendus,* v. 246, June 30, 1958, p. 3625-3628.

To confirm hypothesis that role of iron in etching of Al is decisive, a simple technique of purification by high vacuum melting and progressive solidification was developed, providing an almost totally pure specimen. Micrographic study of treated specimens confirmed effectiveness of elimination of iron impurity; grain subboundaries did not show etch figures. 15 ref.
(M27, M20q; Al-a, *Fe*)

492-M. (Russian.) **X-Ray Investigation of the Plasticity of Single Crystals of Beryllium.** R. I. Garber, I. A. Gindin, V. S. Kogan and B. G. Lazarev. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaya,* v. 20, no. 6, 1956, p. 639-640.

X-ray diffraction, metallography and microinterferometry used to investigate single crystals of Be cut in the form of rectangular parallelepipeds, with one of the faces aligned with the plane of the base. Specimens were deformed by unilateral compression at temperatures from −253 to 800° C.
(M26, Q24; Be, 14-61)

493-M. (Russian.) **X-Ray Diffraction Investigation of the Surface Quality of Metals Treated by Grinding and Fine Cutting.** Yu. S. Terminasov, A. G. Yakhontov and A. V. Poltavskiy. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaya,* v. 20, no. 6, 1956, p. 689-692.

X-ray diffraction (using the broadening and attenuation of the interference lines) and microhardness method used to study dependence of intensitiy of hardening on the metal surface and the distribution of hardening through the surface layer on the technological treatment conditions. Grinding or lathe cutting strengthens the surface layer of the metal, this being evidenced by an increase in the microhardness of 30 to 70%, a broadening of the diffraction lines by 100 to 200% and a reduction in the relative intensity of the lines by 40 to 70%, depending on the working conditions.
(M22g, Q23a, G17)

494-M. (Russian.) **Some Physical-Chemical Properties of Zirconium and Carbon Alloys.** G. V. Samsonov and N. S. Rozinova. *Izvestiia Sektora Fiziko Khimicheskogo Analiza Institut Obshchei i Neorganichesko Khimii imeni Akademiia Nauk SSSR,* v. 27, 1956, p. 126-132.

Roentgenographic and metallographic research and study of microhardness and electric conductivity established that Zr alloys containing 0.64 to 3.12% C by weight were two-phase alloys. The basic (hexagonal) phase is a solid solution of C in Zr, and the second (cubic) phase is a Zr carbide. Alloys containing 3.50 to 11.62% C are one-phase alloys and Zr carbides with the ZrC composition as a limit. Lattice spacing is given.
(M24b; Zr, C)

495-M. (Russian.) **Study of System Fe-Si Within the Range of Compound $FeSi_2$.** N. Kh. Abrikosov. *Izvestiia Sektora Fiziko Khimicheskogo Analiza Institut Obshchei i Neorganicheskoi Khimii imeni Akademiia Nauk SSSR,* v. 27, 1956, p. 157-163.

A part of the system Fe-Si in the range of leboite formation (phase of variable composition on $FeSi_2$ base) studied by thermal analysis, microstructure research, X-ray phases and thermo-emf. measurement of alloys hardened at 900 and 1000° C. A polymorphous transformation of $FeSi_2$ at 960-995° C. was discovered. (M24b; Fe, Si)

496-M. (Russian.) **Electron Diffraction Investigation of the Degree of Perfection of Germanium Single Crystals.** S. A. Seniletov and Z. G. Pensker. *Kristallografiya,* v. 1, no. 2, 1956, p. 209-213.

Crystals were ground with corundum powder or etched in boiling hydrogen peroxide. Electron diffraction patterns produced with ground crystals displayed Debye rings and spots, thus showing that when Ge is ground individual blocks are formed in the surface layer, turned by angles of approximately 2 to 3° C. relative to each other (mosaics) and minute crystals are torn off the surface. Individual blocks, forming in grinding (mosaics), penetrated to the crystal at a depth of 40 to 80 microns. (M26n, M22h; Ge, 14-61)

497-M. (Russian.) **Electron-Diffraction Investigation of the Structure of Thin Layers of Cadmium Sulphide, Selenide and Telluride.** S. A. Semiletov. *Kristallografiya,* v. 1, no. 3, 1956, p. 306-310.

Using point electron diffraction patterns, obtained from CdS, CdSe and CdTe films, various types of orientations of crystals of these compounds have been established relative to rock salt and mica. All the samples disclosed the presence of crystals of both modifications of the substances investigated, this being explained by the small difference in the lattice energy of these modifications. (M26q, M26r, M22h; Cd)

498-M. (Russian.) **Study of System Copper-Magnesium-Tin in Range of Cu-Cu_2Mg-CuMgSn.** Ye. Cherkashin, Ye. I. Gladyshevskiy and M. Yu. Teslyuk. *Izvestiia Sektora Fiziko Khimicheskogo Analiza Institut Obshchei i Neorganicheskoi Khimii imeni Akademiia Nauk SSSR,* v. 27, 1956, p. 212-216.

Structure of the system was studied microscopically and by X-ray. Alloys of the cross-section Cu_2Mg-CuMgSn are homogeneous in the range of 0 to 15 at.% Sn; along the cross-section Cu_2Mg-Sn the maximum solubility is 12 at.% Sn. The compounds Cu_2Mg and Cu_4MgSn do not produce any continuous series of solid solutions. The data of Sn solubility in Cu_2Mg are compared with the data of solubility of Be, Zn, Cd, Al, Si, Pb and Sb in Cu_2Mg and Cu. (M24c; Cu, Mg, Sn)

499-M. (Russian.) **Phase Composition and Phase Homogeneity Limits of Vanadium-Carbon Oxygen System. Pt. 1. Vanadium-Carbon System.** M. A. Gurevich and B. F. Ormont. *Zhurnal Neorganicheskoi Khimii,* v. 2, no. 7, 1957, p. 1566-1580.

Previously abstracted from original. See item 375-M, 1957. (M26r; V)

500-M.* **Further Observation on Grain Boundary Melting.** F. Weinberg. *Acta Metallurgica,* v. 6, Aug. 1958, p. 535-538.

Melting behavior of grain boundaries in bicrystals of Al and Zn. The melting temperature of the boundary was the same as that of the bulk material within an experimental uncertainty of 0.05° C. for Al and 0.02° C. for Zn. Bicrystals of Zn separated at the boundary before appreciable melting of the component crystals for boundary angles between 26 and 108°. Boundary melting and possibly boundary energy are significantly affected by the position of the boundary. (M27f, N3; Al, Zn)

501-M.* **Deformation Texture in Cold Drawn Nickel Rods.** K. Tangri and D. S. Eppelsheimer. *Indian Institute for Metals, Transactions,* v. 11, June 1958, p. 19-25.

New X-ray diffraction technique of texture determination which permits complete pole figure coverage with only one diffraction specimen. Deformation textures in 20.6, 40.5 and 60% cold drawn Ni rods are determined with the corresponding pole figures. The preferred orientation in cold drawn Ni may be described as a double fiber texture with [111] and [100] directions aligned along the fiber axis of the drawn rod. 5 ref. (M26c, M22g; Ni)

502-M.* (French.) **Improvements and New Applications of the Technique of Nondestructive Metallographic Examination.** P. A. Jacquet. *Revue de Metallurgie,* v. 55, June 1958, p. 531-554.

Electrolytes recommended for local polishing with buffer and how to use on cuprous metals, carbon steels, 18-8 stainless, light alloys, Mg alloys, Ti, U and Zr. Use of buffer in electrolytic etching. New, faster methods of drying replicas; improved techniques and materials for separation and mounting. Technique for preparation of replicas of small-diameter (2-mm.) wire. 18 ref. (M20)

503-M.* (Italian.) **A New Metallographic Etchant for Steels.** R. M.

Corelli. *Rassegna Chimica,* v. 10, Mar-Apr. 1958, p. 18-19.

Slow-acting solution of monochloroacetic acid and ethyl alcohol is more efficient than customarily used solutions in revealing structural constituents of ferrous alloys. (M20q; ST)

504-M. (Russian.) **Electron Diffraction Investigation of Alloys of Bi and Sb and of Certain Oxides of These Elements.** Z. G. Pinsker, O. S. Orekhvo and A. I. Miller. *Kristallografiya,* v. 1, no. 2, 1956, p. 239-240.

Electron diffraction investigation of thin layers of Bi and Sb, obtained simultaneously by condensation of vapors in vacuum at temperatures ranging from room temperature to approximately 100° C., disclosed an identical structure, corresponding to Sb or Bi with a lattice period *a* continually varying from 4.53 ± 0.01 (Bi) to 4.29 ± 0.01 A, and a period *c* varying 11.88 ± 0.02 to 11.24 ± 0.02 A. Annealing of specimens of all compositions at 200° C. for 15 hr. does not change the diffraction pattern, thus evidencing that it is impossible to attain order in the arrangement of the Bi and Sb atoms. (M22h; Bi, Sb)

505-M.* (English.) **Light-Figure Phenomena Revealed and Crystal Faces Developed by Chemical Etching in Copper and Alpha-Brass Crystals.** Mikio Yamamoto and Jiro Watanabe. *Tohoku University, Science Reports of the Research Institutes,* v. 10, no. 3, June 1958, p. 240-250.

Light-figure phenomena of single crystals of Cu and alpha-brass etched with various chemical reagents. Crystal phases developed by etching; applicability of light figures for determination of crystal orientation. 5 ref. (M20q, M23; Cu, 14-61)

506-M. (Russian.) **Physicochemical Properties of Boron-Carbon Alloys.** G. V. Samsonov, N. N. Zuravlev and I. G. Amnuel'. *Fizika Metallov i Metallovedenie,* v. 3, no. 2, 1956, p. 309-313.

X-ray and microscopic study, as well as measurement of electrical resistance and density of boron-carbon alloys with 5 to 72.5% C. Above 5% C, an imperfect structure of the carbide $B_{13}C_2$ developed, which was characterized by vacant places on the c-axis in the $B_{13}C_2$ lattice. (M26r; B, C)

507-M. (Russian.) **Activity of Sodium in Alloys of Ternary System Tin-Sodium-Zinc.** A. G. Morachevskiy. *Nauchno-Tekhnicheskii Informatsionnyi Byuleten' Leningradskogo Politekhnicheskoko Instituta,* no. 3, 1957, p. 12-19.

Activity was computed using the results of measurement of the emf. of concentration chains of the amalgam type. Water glass (3.8% Na_2O) was used as the electrolyte. Small amounts of Zn do not essentially influence the activity factor of Na in alloys with Sn. The activity factor of Na starts to rise noticeably at the increase of Zn concentration. (M24c; P12b; Sn, Zn, Na)

508-M. (Russian.) **Mechanism of Formation of Through Impact Figures in Zinc.** A. A. Urusovskaya. *Trudy Instituta Kristallografii, Akademii Nauk, SSSR,* v. 12, 1956, p. 180-185.

When the surface of the base of a single crystal of Zn is struck with a needle, a hexahedral cavity appears, outlined by tracks of twin streaks. On the opposite side of the plate, a hexagonal pyramidal projection appears, turned relative to the crater on the upper surface by an angle of 30°. If the outline of the cavity on the surface of the base on which the impact is made corresponds to the tracks of the planes of a pyramid of the first kind (1012), then the outline of the projection corresponds to the trace of the planes of a pyramid of the second kind (1122). (M26n, Q6; Zn, 14-61)

509-M. (Russian.) **Constitution Diagram and Properties of Alloys of the System Ni-Ti.** L. I. Pryakhina. *Trudy Instituta Metallurgii, Akademiia Nauk SSSR,* v. 2, 1957, p. 119-125.

System investigated by microstructure, specific electric resistivity, and hardness. A region of limited gamma solid solution of Ti in Ni is established at 800° C. The curve of solubility of Ti and Ni at 800° C. passes between the compounds with 8 and 10.8% Ti. Diagrams of composition versus electric resistivity, hardness and refractoriness plotted and studied for alloys of the Ni-Ti system (containing up to 16% Ti). (M24b; Ni, Ti)

510-M. (Russian.) **Investigation of Alloys of the System Ag-Mn-Al.** D. A. Petrov and A. Ya. Potemkin. *Zhurnal Neorganicheskoi Khimii,* v. 2, no. 7, 1957, p. 1552-1565.

Constitution diagram was plotted for the Ag-corner of the system

Ag-Mn-Al up to 10% Al and up to 30% Mn. The liquidus surface consists of three fields of primary crystallization of phases alpha, beta and Mn. There exist three nonvariant equilibriums in the Ag-corner of the Ag-Mn-Al system. Saturation limits of the alpha solid solution in a silver base determined approximately; distribution of the phase regions at temperatures of 700, 600, 400, 200 and 20° C. Properties of the alloys of Ag with Mn and Al; electric resistivity and hardness depend on composition of the alloys. (M24c; Ag, Mn, Al)

511-M.* Microscopic Observations of the Surface of InSb Monocrystals. J. Auleytner and B. Kolakowski. *Acta Physica Polonica,* v. 17, 1958, p. 93-109.

Observations of etched and cleaved surfaces with crystallographic indices (100), (111) and others. Shape of the etch pits is different for the various crystallographic surfaces. Two types of etched figures were observed; they differ in size and in density. 7 ref. (M26s; In, Sb)

512-M.* Structure of Epitaxed Copper Deposited by Evaporation Onto a Clean (00.1) Face of a Titanium Crystal. R. E. Schlier and H. E. Farnsworth. *Physics and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 271-276.

Titanium crystal was cleaned by heating, ion bombardment and annealing in high vacuum. Low-energy electron diffraction was used to determine that the surface was essentially free of contamination and to make structure determinations. The Cu deposits varied in average thickness from 0.5 to 25 atomic layers. The Cu formed at nucleation centers in the form of discrete oriented crystallites with a lattice spacing parallel to the substrate which was the same as that of the (111) plane in the bulk Cu and with the (110) azimuth of Cu parallel to the (11.0) azimuth of Ti. 11 ref. (M26; Cu, Ti)

513-M.* Some Grain Boundary Characteristics in Babbitt and Tin. P. G. Deo and B. D. Sharma. *Scientific and Industrial Research, Journal,* v. 17, July 1958, p. 248-251.

Polycrystalline babbitt and Sn etched under cathodic sputtering and by chemical means are examined by high-resolution microscopy and multiple-beam interferometry. Comparative results obtained on the grain boundaries of cast surfaces indicate that these level differences are due to the deformation of the grains caused by the temperature variation. 5 ref. (M21c, M27f; Sn, Sb)

514-M.* (Czech.) Practical Possibilities of the Use of Lattice Quantitative Metallographic Analysis. Zdenek Ministr. *Hutnicke Listy,* v. 13, no. 7, 1958, p. 598-603.

Quantitative metallographic analysis in addition to its own relative errors has inaccuracies depending upon resulting capacity and focusing. Special reference to porous materials. Examples of conversion of volume parts to weight parts in two or more component structures. (M23)

515-M. (Russian.) X-Ray Diffraction Investigation of Several Alloys of Transition Metals With Silicon. Ye. I. Gladyshevskiy, P. I. Kripyakevich and Yu. B. Kuz'ma. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 454-456.

Investigation was made of sections of Mn_3Si-Fe_3Si, Mn_3Si-Co_3Si, Mn_3Si-Ni_3Si, and Mn_3Si-Cu_3Si. The Mn_3Si and Fe_3Si compounds form with each other a continuous series of solid solutions. In the Mn-Co-Si system there was found a Co_2MnSi compound of a CsCl-type ($a = 2.827 \pm 0.001$ kX). No triple compounds of the types CsCl, BiF_3 or Cu_2MnAl are observed in the Mn-Ni-Si and Mn-Cu-Si systems. (M24, M22g; Si)

516-M. (Russian.) Study of Alloys of Gold-Cobalt System. A. T. Grigor'yev, Ye. M. Sokolovskaya and M. V. Maksimova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1047-1051.

Studied by thermal analysis, microstructure, hardness and electric resistance. Au with an admixture content under 0.01% and Co containing 0.01% carbon were used as initial materials. Au and Co produce a simple graph with a eutectic at 10% Co and temperature of 995° C. The solubility of Co in Au and of Au in Co is 8 and 6% at 995° C. and 5 and 5% at 900° respectively. (M24b; Au, Co)

517-M. Beta-Wolfram Structure of Compounds Between Transition Ele-

ments and Aluminum, Gallium and Antimony. E. A. Wood, V. B. Compton, B. T. Matthias and E. Corenzwit. *Acta Crystallographica,* v. 11, Sept. 10, 1958, p. 604-606.
13 ref. (M26q; Al, Sb, Ga)

518-M. The Crystal Structure of a M_2B_3-Type Double Boride. H. J. Beattie, Jr. *Acta Crystallographica,* v. 11, Sept. 10, 1958, p. 607-609.

A new boride structure has been found in alloys HS-88 and Incoloy 901, each with around 0.1% B addition. The borides were extracted electrolytically from unaged specimens and examined by X-ray powder analysis. Small amounts of TiC were also present in both extracts. Incoloy 901 without B does not produce this structure.
(M26r, Ni-b, *B*)

519-M. On the Distribution of Impurity Atoms in the Stress Field of a Dislocation. D. N. Beshers. *Acta Metallurgica,* v. 6, Aug. 1958, p. 521-523.

Impurity atoms distributed in the stress field of a dislocation obey Fermi-Dirac statistics. Result is applied to two experimental situations. The binding energy of an impurity to a dislocation is determined. 5 ref. (M26b, 3-69)

520-M. X-Ray Diffraction Studies of a Binary Alloy Containing Metals With Dissimilar Crystal Structures, Valences and Ionic Radii. G. P. Chatterjee, J. K. Mukherjee and K. C. Som. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 219-225.

Forms of the intermetallic compound Cu_2Mg are interpenetrating type f.c.c. structure with 8 molecules per cell. The lattice structure is similar to but not exactly like the f.c.c.-ZnS type; the lattice parameter is ao = 7.064 Å; the lattice bond of Cu_2Mg is not truly metallic. 4 ref. (M26q, Cu, Mg)

521-M. Studies on Surface Structure by Electron Diffraction. A. Goswami. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 227-236.

Surface structure and crystal growth process in electrodeposition, oxidation reaction and corrosion phenomena. 18 ref.
(M22h, N12d, R1)

522-M. Electron Microscopy. A. R. Deo and M. K. Gharpurey. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 237-245.

Techniques of specimen preparation. Plastic replicas give poor resolution. Silica replicas as well as anodic aluminum oxide replicas permit a resolution of about 100 Å, while with carbon a resolution better than 50 Å has now been reported. 11 ref. (M20r, M21e)

523-M. Interfaces Between Metallic Crystal Grains. G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 275-284.

Relationships between temperature, surface tension and composition of homogeneous binary alloys considered thermodynamically. 8 ref. (M27b)

524-M. Preparation of Tin and Tin Alloys for Micro-Examination. B. L. Eyre. *Metallurgia,* v. 58, Aug. 1958, p. 95-106.

Techniques used at the Tin Research Institute, based on conventional grinding and polishing techniques, using specially selected abrasives and polishing cloths. Diamond abrasives are employed for the major part of the fine polishing. 13 ref. (M20p; Sn)

525-M. (German.) **Screw Dislocation in Alkali Metals Treated According to Lattice Theory.** Chr. Lehmann and G. Liebfried. *Physics and Chemistry of Solids,* v. 6, Aug. 1958, p. 195-204.
10 ref. (M26b)

526-M. (Russian.) **Nonferrous Metallography With Polarized Light.** V. S. Ermakov. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 838 + 4 p. of illustrations.
6 ref. (M21c; EG-a38)

527-M. (Russian.) **Appearance of Low-Carbon Steel Structure After Electrolytic Polishing and Etching.** B. S. Kasatkin. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 842-843.
4 ref. (M21c; CN-g)

528-M.* Activities in the Chromium-Nickel System. M. B. Panish, R. F. Newton, W. R. Grimes and F. F. Blankenship. *Journal of Physical Chemistry,* v. 62, Aug. 1958, p. 980-982.

Chromium activities in the Ni-Cr system were obtained from the potentials between Cr and alloy electrodes in an electrolyte of molten NaCl-RbCl mixture containing about 0.5% $CrCl_2$. Seven alloy com-

positions ranging from 11 to 96 at. % Cr were studied at 750° and the 53 and 96% alloys also at 965°. The activity coefficient of Cr at 750° ranges from about 0.5 to 1.0 as the Cr concentration increases to 30%, then increases sharply as the miscibility limit at 40% is approached. (M24b, P12b; Ni, Cr)

529-M. The Uranium-Nitrogen-Carbon System. Alfred E. Austib and Arnold F. Gerds. Battelle Memorial Institute. *U. S. Atomic Energy Commission BMI-1272,* June 23, 1958, 18 p.

System studied at 1800° C. under vacuum and under a 1-atm. nitrogen pressure. There is complete solid solubility between UN and UC, and essentially no solid solubility of nitrogen in UC_2 or U_2C_3 or of carbon in U_2N_3. 9 ref. (M24c; U, N, C)

530-M.* (English.) **Oxidation Method of Determining Austenitic Grain Size in Mild Steel.** P. Szeki. *Acta Technica,* v. 21, no. 1-2, 1958, p. 79-86.

Simple method developed austenitic grain boundaries within 20 to 25 min. by heating prepared metallographic specimens in a tubular furnace in a stream of industrial nitrogen. Oxygen present in the industrial gas oxidizes grain boundaries of austenite. Method used to investigate austenitic grain size of a mild steel at 970 to 1170° C. The temperature of austenitic grain coarsening and the calculated solution temperature of AlN were in good accord. 4 ref.
(M23r, M27c; CN)

531-M.* Study of Non-Metallic Inclusions in Castings, Using a Radioactive Tracer. B. B. Gulyaev. *Foundry Trade Journal,* v. 105, Sept. 18, 1958, p. 341-344.

Previously abstracted from original. See item 418-M, 1956.
(M27, 1-59, E11)

532-M. Electron Metallography of the Al-Ni-U Bond. Carl L. Angerman, E. I. du Pont de Nemours & Co. *U. S. Atomic Energy Commission, DP-248,* Dec. 1957, 22 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.75.

The diffusion zones formed during the bonding of Ni plated U cores to Al sheaths were identified by correlating the appearance of these zones with those identified in diffusion couples. A relationship between the structure and the strength of the bond was observed. 13 ref. (M21e, K5k, Ni; Al, U, *Ni*)

533-M. Measurement of the Absolute Energy of Low-Angle Dislocation Boundaries in Zinc. R. B. Shaw, T. L. Johnston, R. J. Stokes, J. Washburn and E. R. Parker. California University Institute of Engineering Research. *U. S. Office of Technical Services,* PB 126531, May 1956, 32 p. (Available at Library of Congress, Washington, D. C.) Microfilm $3, photocopy $6.30.

Theoretical study on dislocation boundaries, combined with microscopic examination of a low-angle boundary in a small tapered Zn crystal which was heated to within a few degrees of the melting point. (M26b, P12; Zn)

534-M.* (German.) **Rolling Textures of Transformer Sheet.** Hermann Moeller and Helmut Staeblein. *Archiv für das Eisenhüttenwesen,* v. 29, June 1958, p. 377-390.

Using a Geiger counter X-ray diffraction goniometer of an improved design with monochromatic radiation from lithium fluoride the cold, hot and cross rolling textures of steel with 2.65% and 2.85% Si were investigated and pole figures were determined. Both strain and compression textures were found, verifying former observations. Through the utilization of monochromatic radiation a better relation between line intensity and background was obtained, eliminating the distorting effects of influence. 36 ref.
(M26c, F23; AY, Si, SGA-n)

535-M.* (German.) **Cubic Position as a Recrystallization Texture in Iron-Silicon Alloys.** Hans-Eberhard Mobius and Franz Pawlek. *Archiv für das Eisenhuttenwesen,* v. 29, July 1958, p. 423-437.

Formation of perfect cubic positions in the secondary recrystallization process from a prepositional structure in the (110) [001] and (100) [001] planes is observed step by step. The influence of Si content (1.8 to 2.2%) and intermediate heat treatments upon formation of the texture is analyzed. 24 ref.
(M26c, N5; Fe, *Si*)

536-M.* (German.) **Recrystallization Texture in Cold-Rolled Transformer Sheet.** Helmut Staeblein and Hermann Moller. *Archiv für das Eisen-*

hüttenwesen, v. 29, July 1958, p. 433-447.

X-ray photographs were taken and pole figures developed in the (110) and (200) planes on primary and secondary recrystallization textures of materials with 0.052% and 0.011% C and 2.65% Si. The influence of rate of deformation, annealing temperature between 500 and 1300° C. and carbon contents particularly upon the texture [100] (011). 39 ref. (M26c, N5; ST, SGA-n)

537-M.* (German.) **New Observations on Sub-Grains of Aluminum.** Dietrich Altenpohl. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 331-342.

Sub-grains were observed on Al by means of X-rays as well as light and electron microscopes. Sub-grains of 1 micron appear mainly after plastic deformation of polycrystalline structures. At 183° C. no subgrains were observed. Apparently in the recrystallized state an accumulation of impurities along the sub-grain boundaries takes place, consisting of iron and hydrogen and probably copper atoms. Various theories on the development of subgrain structures. 45 ref. (M27c; Al)

538-M.* (Polish.) **Thermodynamic Characteristic of Intermetallic Phases of the Daltonide and Berthollide Type.** Janusz Terpilowski and Wlodzimierz Trzebiatowski. *Archiwum Hutnictwa,* v. 3, no. 2, 1958, p. 97-112.

Electrochemical data were used to calculate changes of such partial molal thermodynamic values as thermodynamic potential, entropy and enthalpy for the less noble components within the range of intermediate phases for the metallic systems: Ag-Cd, Au-Cd, Cu-Zn, Bi-Tl and Pb-Tl. On the basis of previous work it was found that calculated thermodynamic values in the limits of existence of the beta and epsilon phases for Au-Cd system and gamma phase for systems Ag-Cd, Cu-Zn were characteristic for phases of the daltonide types. Remaining phases were Berthollide type. 36 ref. (M26q, P12; Ag, Cd, Au, Cu, Zn, Bi, Tl, Pb)

539-M.* **The Aluminum-Rich End of the Aluminum-Vanadium System.** D. M. Bailey, O. N. Carlson and J. F. Smith. *American Society for Metals, Transactions,* v. 51, Preprint no. 81, 1958, 6 p.

Aluminum-vanadium phase diagram revised on the basis of additional X-ray and thermal data. A new intermetallic compound, α' (Al-V), with a formula close to that of Al_7V, was found to undergo peritectic decomposition at 688° C. A peritectic horizontal was established at 661.9° C. in the Al-rich end of the diagram. 10 ref. (M24b; Al, V)

540-M.* **Lattice Parameters of Uranium From 25 to 1132° C.** P. Chiotti. H. H. Klepfer and R. W. White. *American Society for Metals, Transactions,* v. 51, Preprint no. 83, 1958, 12 p.

Lattice parameters of U were measured by X-ray diffraction techniques over the range from room temperature to 1060° C. Atomic volume and density as functions of temperature. The change in volume for the alpha-beta transformation was calculated to be 1.12% and for the beta-gamma transformation, 0.70%. 13 ref. (M26, 2-61, N6p; U)

541-M.* **The Constitution of Rhenium-Tungsten Alloys.** J. M. Dickinson and L. S. Richardson. *American Society for Metals, Transactions,* v. 51, Preprint no. 88, 1958, 12 p.

Constitutional diagram proposed. Two intermediate phases were found. Sigma phase formed peritectically at 3000° C. and chi phase formed peritectoidally at 2125° C. A eutectic was found at 74% Re and 2825° C. W dissolved up to 37% Re and Re up to 20% W. 5 ref. (M24b; Re, W)

542-M.* **Metallographic Identification of Inclusions in Uranium.** George L. Kehl, Eric Mendel, Emilio Jaraiz F. and Melvin H. Mueller. *American Society for Metals, Transactions,* v. 51, Preprint no. 100, 1958, 14 p.

Identification of UN, U(C,N), UC, UO, UH_3, UO_2 and U_6Fe. True identity of various inclusions established by removing the inclusion with ultrasonic "jack hammer" and subjecting debris so created to X-ray diffraction analysis. Metallographic examination established on the basis of time required to electroplate the inclusions with Cu and on the character of the Cu deposits. 8 ref. (M23, M22g; U, 9-69)

543-M.* **An X-Ray Metallographic Study of Arc-Cast Tungsten.** Sam Leber. *American Society for Metals, Transactions,* v. 51, Preprint no. 103, 1958, 12 p.

Double crystal X-ray diffraction camera techniques can be used to provide a complete analysis of the distortions of the lattice planes within crystals. Data obtained from two arc-cast tungsten grains are used to describe the modes of distortion, misorientations across subboundaries, character of subboundaries, etc. An X-ray micrographic technique is presented as an aid in determining the spatial and orientation relationships between subgrains. 13 ref. (M26, M22g; W)

544-M.* Shape, Size and Growth of Some Intermetallic Compounds in Liquid Bismuth. P. J. Barton and G. W. Greenwood. *Institute of Metals, Journal,* v. 86, Aug. 1958, p. 504-509.

Shapes and sizes of particles of binary intermetallic compounds of U, Th, Ce, Zr, Mg, Ca, Sr, Ba, Te and Se with bismuth studied metallographically with respect to their mode of preparation, after isothermal treatment in liquid bismuth, under changes in temperature and on precipitation from solution. 16 ref. (M26q; Bi, 4-60)

545-M.* Preferred Orientation in Thorium. L. K. Jetter and C. J. McHargue. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 161-185.

Deformation fiber texture of extruded Ames Th was found to be <111>. Recrystallization occurring during the fabricating process produced <001> or <114> fiber textures. 13 ref. (M26c, N5; Th)

546-M.* Metallography of Thorium. H. P. Roth. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 282-295.

Mechanical polishing, electrolytic polishing and etching. Typical microstructures illustrate structural changes due to differences in composition and treatment of the metal. 11 ref. (M27, M20; Th)

547-M.* The Constitution of Thorium Alloys. F. A. Rough, Arthur A. Bauer and H. A. Saller. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 316-351.

Data for the following alloy systems: Th-Al; Th-Be, Th-B, Th-C, Th-Cr, Th-Cu, Th-Au, Th-Hf, Th-Pb, Th-Ni, Th-Nb, Th-Se, Th-Ag, Th-Ti, Th-V, Th-U, Th-Zr, Th-Bi, Th-Ca, Th-Ce, Th-Fe, Th-Mn, Th-Mo, Th-W, Th-Zn and Th-Ta. 78 ref. (M24; Th)

548-M. (Chinese.) **Formation and Development of a Secondary Structure in Aluminum Crystals Deformed at High Temperatures.** Liu I-khuan' and Tso Tzsutzsun and Uli Sieubao. *Acta Physica Sinica,* v. 12, no. 6, 1956.

Formation of a secondary structure in Al on deformation at high temperature studied by X-ray and metallographic methods. Single crystal and polycrystalline specimens of 99.67% pure Al were subjected to stretching at 200-630° C. at various speeds. Formation of the secondary structure is a result of deformation of the crystalline structure. Grain size of the secondary structure depends on temperature and speed of deformation; lowering the speed of deformation and increasing temperature causes a coarsening of the grain of the secondary structure. (M27c, 3-68; Al)

549-M. (Chinese.) **Investigations of the Lithium-Carbon System.** P. I. Fyodorov and Su Myan'-Tszen. *Khusiue Siuebao,* v. 23, no. 1, 1957, p. 30-39.

System within the limits Li-Li_2C_2 studied by thermal and X-ray structural analyses. Alloys were prepared and cooling curves recorded in an argon atmosphere. A eutectic is formed at 1% C and a temperature of 165° C. By determining the boiling points, the vapor pressure of pure Li and of alloys containing up to 15% C at 790-950° C. was found. At higher temperatures the liquidus was determined by the vapor pressure isobars. Li_2C_2 has some polymorphic modifications with transformation temperatures at about 410, 440 and 560° C. (M24b; Li, C)

550-M.* (French.) **Lamellar Structure of a Thin Film of the Eutectic Alloy of Aluminum and Copper Observed in the Electron Microscope.** N. Takahashi and K. Ashinuma. *Comptes Rendus,* v. 246, June 23, 1958, p. 3430-3433.

Pronounced lamellar structure was found in eutectic of 33% Cu and 67% Al (by weight) by direct observation by transmission electron microscopy. This structure was observed in all specimens examined, indicating that the ratio of components of this alloy remains invariable both in thin film and in massive state. Transformation due to heating was also observed. (M27d, M21e; Al, Cu, 14-62)

551-M. (Russian.) **Phases of the System Tungsten-Boron.** G. V. Samsonov.

Doklady Akademii Nauk SSSR, v. 113, no. 6, 1957, p. 1299-1301.

Alloys containing 0.9-81.4 at.% B, obtained by hot pressing, were studied by microhardness, X-ray and metallographic analyses. The following phase zones were found: solid alpha-solution of B in alpha-W (maximum hardness 550-770 kg. per sq. mm.); alpha + gamma (W_2B), extending to 33.3 at. %B, hardness of W_2B 2420 kg. per sq.mm.; with several others. (M24b; W, B)

552-M. (Russian.) **Lattice Parameter of Pure Metallic Vanadium and Effect of Oxygen on Change of Parameter.** M. A. Gurevich, B. F. Ormont. *Fizika Metallov i Metallovedenie*, v. 4, no. 1, 1957, p. 112-114.

Lattice parameter of V obtained by different methods; comparison with results of other investigators. For pure V the value $a = 3.024 + 0.001$ Å is proposed. A table gives the relation of a to the dissolved oxygen content (up to 3.2 at. %). (M26n; V)

553-M. (Russian.) **Metallographic and X-Ray Study of Alloys of the System Antimony-Iridium.** R. N. Kuz'min, G. S. Zhdanov and N. N. Zhuravlev. *Kristallografiya*, v. 2, no. 1, 1957, p. 48-50.

Alloys of chemically pure Sb and Ir were prepared by fusing or sintering under a small positive pressure of argon. Melting points were found by cooling curves recorded on electronic automatic potentiometer and also by the method of drop formation. Possible phase diagram of the system Sb-Ir was plotted. At 615° C. near pure Sb the eutectic reaction takes place. Existence of the compounds $IrSb_3$ and $IrSb_2$ was established. (M24b; Sb, Ir)

554-M. (Russian.) **Phase Diagram of the System Mg-Mn.** D. A. Petrov, M. S. Mirgalovskaya, I. A. Strel'nikova and E. M. Komova. *Trudy Instituta Metallurgii Akademiia, Nauk SSSR*, no. 1, 1957, p. 142-143.

Alloys containing up to about 5% Mn were studied. The solubility of Mn in liquid Mg was determined by thermal analysis. At 850, 790, 760, 710 and 670° C. it is 4.95, 3.83, 3.11, 2.58 and 2.10% respectively. The solubility of Mn in solid Mg was determined by microstructural analysis and microhardness measurement. The non-variant 3-phase reaction at 653° C. was determined as a peritectic. The non-variant point was located at 2.0% Mn. (M24b; Mg, Mn)

555-M. (Russian.) **Structure of Liquid Metals.** I. V. Radchenko. *Uspekhi Fizicheskikh Nauk*, v. 61, no. 2, 1957, p. 249-276.

Experimental conditions for X-ray diffraction study of liquid metals, possible errors in obtaining X-ray photographs and their interpretation. Basic results of X-ray and neutron photograph investigations. Critical comparison of work on the structure of Hg, liquid metals with a dense packing of atoms in the solid state (Au, Pb, Ti, In, Cd, Al, Zn) and alkali liquid metals, (Ga, Bi, Ge, Sb, Se, Te, Sn). 101 ref. (M25, M22; 14-60)

556-M. (Russian.) **Investigation of the Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleimonov, L. M. Viting and V. V. Kuprina. *Zhurnal Neorganicheskoi Khimii*, no. 5, 1956, p. 1064-1066.

Investigation by thermal analysis, microstructure and hardness measurement. Alloys were prepared from electrolytically manufactured materials by melting in alumina crucibles in an electric resistance furnace with Kryptol heater elements under a barium chloride cover, then held in vacuum at 1000° C. for 100 hr. and slowly cooled. No discontinuity in solubility in the molten state was revealed. Peritectical reaction beta + liquidus $\rightleftharpoons$ gamma takes place at 1112° C., the magnetic transformation at 1045° C. and the transformation beta→alpha at 305° C. (M24b, N12; Cu, Co)

557-M. (Russian.) **Phase Transformations in the Iron-Chromium-Vanadium System.** I. I. Kornilov and N. M. Matveeva. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 2, 1957, p. 355-366.

Investigated by differential thermal analyses, hardness measurement, specific electrical resistance, microstructure and X-ray analysis. The system was investigated along a section which ran through the compositions of the phase compounds Fe-Cr and Fe-V (50 at.% Fe), and along a ray section running from the Fe corner to the Fe-V side, at ratios Cr: V of 1:3, 1:1, and 3:1. (M24c; Fe, Cr, V)

558-M. (Russian.) **Phase Diagram of the Ternary System Ni-Cr-W.** I. I. Kornilov and P. B. Budberg. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 4, 1957, p. 860-867.

Part of the phase diagram up to 50% Cr and 30% W was studied. The alloys were melted in corundum

crucibles under a large layer of basic slag, and subjected to gradual homogenizing anneal at 1200, 1000 and 800° C. By thermal and microstructural analysis, two vertical sections of the system with 10 and 30% W were constructed, and the temperatures of the beginning of crystallization of the alloys of these sections were established.
(M24C; Ni, Cr, W)

559-M.* Metallographic Polishing. L. E. Samuels and M. Hatherly. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 111-123.

Principles of modern methods. 65 ref. (M20p)

560-M.* Etching. B. D. Cuming and A. J. W. Moore. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 124-142.

Theory of solution etching; thermal etching and vacuum evaporation; cathodic ion bombardment; new etchants for metallography; crystal faces revealed by etchants. 138 ref. (M20q)

561-M. Interior Metallography. N. A. McKinnon and H. L. Wain. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 157-168.

Conditions necessary for the detection of dislocations in the interior of ionic crystals, semiconductors and metals. 37 ref. (M26b)

562-M.* X-Ray Metallography. J. H. Auld and R. A. Coyle. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958, p. 169-182.

X-ray metallography can be based on absorption, emission or diffraction of X-rays by the specimen. The first two methods provide information on the size, shape and distribution of components of a heterogeneous system, while diffraction methods also give lattice relationships in both homogeneous and heterogeneous systems. 28 ref.
(M21f, M22g)

563-M.* Plutonium. *Nucleonics,* v. 16, Aug. 1958, p. 96-100.

Study of Pu alloys suitable for fuel elements. Phase diagrams of Pu with U, Ni, Al, Fe, Bi, Th, Pb. Various intermetallic compounds described.
(M24b, T11g, 17-57; Pu, Al, Bi, Fe, Pb, Ni, Th, U)

564-M. Constitution of Uranium and Thorium Alloys. Frank A. Rough and Arthur A. Bauer. Battelle Memorial Institute, June 2, 1958. *U. S. Atomic Energy Commission, BMI-1300,* 138 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.75.

Systems arranged in alphabetical order. Major sections include both binary and ternary systems. Constitutional diagrams are given whereever available. 100 ref. (M24; U, Th)

565-M.* (French.) **Electronic Structure of Transition Metals and Alloys and Heavy Metals.** J. Friedel. *Journal de Physique et le Radium,* v. 19, June 1958, p. 573-581.

Electronic structure of transition metals (Fe, Co, Ni, Pd, Pt, etc.) dissolved as impurities in other metals (Cu, Al, etc.) is now fairly well understood. This knowledge permits approach to problems arising in connection with concentrated alloys and pure transition metals, as well as for rare earths and heavy metals. 16 ref. (M25)

566-M.* (Italian.) **Chromium-Vanadium-Oxygen and the Aluminum-Vanadium-Oxygen Systems.** Aurelio Burdese. *Annali di Chimica,* v. 48, June-July 1958, p. 510-516.

Study of reciprocal relationships of coexistence at various temperatures of phases which appear in these systems. Behavior of systems is almost identical. In addition to oxides of V, Cr and Al, the following ternary phases are found: $CrVO_4$, $AlVO_4$, and a complete series of solid solutions $(Cr, V)_2O_3$. On the other hand, sesquioxides of V and alumina show partial solubility in solid state. In VO_2-Cr_2O_3-V_2O_3 zone of the Cr-V-O system the end of crystallization takes place at 640° C., corresponding to ternary eutectic V_2O_5-V_6O_{13}-$CrVO_4$. Corresponding ternary eutectic of the Al-V-O system melts at 620° C. 6 ref.
(M24c, P12; Cr, V, O)

567-M. Preparation of Powder Specimens From Active and Toxic Metals for Use in Conventional X-Ray Diffraction Studies. A. Moore, D. B. Wright and A. J. Martin. *Journal of Scientific Instruments,* v. 35, Aug. 1958, p. 301-303.

(M20, M22g, A7)

568-M. Diagram of Cu-Si-Zn Alloy. Pt. 2. Genjiro Mima and Masaharu Hasegawa. *Osaka University, Technology Reports,* v. 7, Oct. 1957, p. 385-397.

(M24c; Cu, Si, Zn)

569-M.* Surface Finish—Metallurgical and Mechanical Aspects. K. G. Lewis. *Metal Treatment and Drop Forging,* v. 25, Sept. 1958, p. 377-384.

Various expressions used in the study of surface finish, together with the more important machine and material variables which affect them. Chip formation and its influence on surface finish. Effect of metallographic structure on the formation of built-up edge. Investigations into the mechanism underlying the formation of "smear metal", and the various means for its removal. Examination of the effect of cold working on surface finish. (Concluded.) 57 ref. (M27, S15, G17)

570-M.* (German.) **Formation of Goss Structure in Iron-Silicon Alloys.** K. Detert. *Metall,* v. 12, Sept. 1958, p. 817-821.

Goss-structure sheet metal is important in the manufacture of transformers because of its magnetic properties. Alloys with 3% Si, 0.1% Mn, and sometimes 0.1% Ni, 0.1% Cu, first hot rolled to 3.4 mm. then cold rolled in several steps with intermediate annealing at about 800° C., were structure tested. Goss-structure favored by cold working is thought to be influenced by still unknown trace elements. 21 ref. (M27g, M26c, P16; SGA-n, Fe-b, *Si*)

571-M.* (German.) **"Stacking Faults" in Cold Deformed Metals With Face-Centered Cubic Lattices.** Ch. Wagner. *Metall,* v. 12, Sept. 1958, p. 824-829.

Lattice faults as a consequence of cold deformation detectable by X-ray interference lines. Polycrystalline materials tested by diffractometer and photographic methods. Increase in strength and rigidity after cold working thought to be a consequence of "stacking faults" in the lattice structure. 27 ref. (M26s, 3-68)

572-M.* (Japanese.) **Atomic Power and Metals; Radiation Damage.** E. Fujita. *Metals,* v. 28, Sept. 1958, p. 673-676.

Damage is caused by an atomic collision of neutron and an atom in a lattice point. A neutron of the order of MeV in a pile can damage severely, but thermal neutron can not. The particles which can do the damage are fast neutrons, fast protons and deuterons, fast alpha-particles, fast electrons, hard X-rays, nuclear fission products and accelerated ions, which should have energy of the order of MeV. Radiation damage consists of atomic displacement in lattice, formation of Frenkel lattice imperfection, formation of impurity and thermal spike and displacement spike (or recoil). (M26, P18, 2-67)

573-M. Investigation of Thermodynamics and Composition of Wustite. H. Engel. *Archiv für das Eisenhüttenwesen,* v. 28, no. 2, Feb. 1957, p. 109-115. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB34.)

(M26; Fe)

574-M. New Electrolytic Reactions for Stainless Steels Containing the Sigma Phase. I. Bertetti. *Metallurgia Italiana,* no. 7, 1956, p. 324-326. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GE85.)

Previously abstracted from original. See item 363-M, 1956. (M21, M27; SS)

575-M. (Russian.) **Measurement of Local Characteristics of Alloys by Radioactive Isotopes.** S. Z. Bokshtein. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 974-978.

Methods study local structure and changes in metal microstructures, including use of electron microscope, X-ray analysis, microspectral method and autoradiography with particular emphasis on the latter. 35 ref. (M21, M22, M23, 1-59)

576-M. Some Data on the Phase Diagram of the Chromium-Columbium System. V. P. Elyutin and V. F. Funke. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 3, Mar. 1956, p. 68-76. (Henry Brutcher, Altadena, Calif., Translation no. 4304.)

Experimental preparation of specimens; determination of melting points; liquidus temperatures; three portions of the solidus. Phase composition and structure of alloys; results of micrographic analysis and microhardness measurements. Identification and composition of intermetallic compounds; eutectic transformations and points; boundaries of single-phase solid solutions; data on intersolubility of Cr and Cb. Approximate phase diagram (liquidus and solidus) of Cr-Cb system. (M24b; Cr, Cb)

577-M. (Chinese.) **Basic Factors Influencing the Original Structure of Hadfield Steel.** Chzhai Khun-cyun. *Tszise chzhitsao,* v. 5, no. 3, 1956, p. 5-9.

Grain size in Hadfield steel influences its ductility, impact resistance, wear retsistance and other properties. Grain size depends on Al content, bath temperature, hardening velocity, carbon content, gas content in liquid steel. Introduction of 0.1% Al, lowering the teeming temperature to 1300-1320° C., is recommended. (M27c, Q-general, D9r; AY, *Al,* AD-p35)

578-M.* (French.) **Influence of the Composition of Reagents, With or Without Traces of Copper, on Micrographic Etching of Refined Aluminum.** Gerard Wyon. *Comptes Rendus,* v. 247, July 28, 1958, p. 458-461.

Fluorated aqua regia solutions can, according to their composition, produce two types of etch patterns, either large geometric figures or very numerous microfigures. Addition of a few parts per million of Cu ions transforms a microfigure etchant into an etchant that produces geometric figures, but only when applied to Al of commercial purity. 8 ref. (M20q; Al)

579-M. (Russian.) **Electron Microscopy of 1Kh18N9T Steel After Various Forms of Heat Treatment.** E. I. Kvashina. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 35-38.

Influence of hardening temperature and aging temperature and duration on microstructure of steel containing 0.11% C, 1.20% Mn, 0.42% Si, 17.9% Cr, 10.06% Ni, 0.50% Ti, 0.21% S and 0.02% P. When hardening temperature is raised from 1100 to 1300° C. the quantity of Ti carbides is reduced. When hardened at 1050-950° C., an acicular phase appears alongside the Ti carbides. The nature of the acicular phase has not been established. The sharp increase in impact strength when hardened at a temperature above 1050° C. is linked with the diffusion of this phase. (M27, 2-64; SS)

580-M.* **Structure Determined Properties of Evaporated Bismuth Films.** Carl E. Drumheller. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 27-33.

Infrared electrical and electron microscope studies on Bi films obtained by condensation on cellulose nitrate substrate. Films possessed single-layer polycrystalline structure; thickness resistance measurements and low-frequency current noise studies indicated that major contribution to film resistance was from grain boundaries. Grain boundaries fell into two distinct categories according to whether they divide crystallites with similar or unrelated orientations. (M26, M27; Bi, 14-68)

581-M.* (Japanese.) **Anomalous Characteristics of Finished Metal Surfaces.** M. Matsunaga. *Metals,* v. 28, Oct. 1958, p. 721-725.

Depending on the finishing method, metal surfaces have completely different characteristics from the interior. Methods of measurement are: (1) optical (microscope, polarization, reflection); (2) diffraction (X-ray); (3) electric (surface potential, resistance); (4) microhardness testing; (5) surface property (fluid resistance, friction); (6) chemical (corrosion); (7) electrochemical (electrode potential, electrolytic deposit). Anomalies are caused by smut and smear, adsorption, chemical changes, mechanical strain and lattice imperfections. (M27, M21, M22, S14)

582-M. **Modern Techniques in Electron Metallography.** R. I. Garrod and J. F. Nankivell. *Australian Institute of Metals, Journal,* v. 3, Aug. 1958. p. 183-202.

Preparation and use of replicas; advantages and limitations of reflection, emission and scanning microscopy. Methods recently developed for direct examination of thin foils. Techniques complementary to electron microscopy, such as electron microdiffraction and electron probe analysis. 123 ref. (M21e)

583-M. **Crystal Structure of Ni_2B and Co_2B.** Stig Rundqvist. *Acta Chemica Scandinavica,* v. 12, no. 4, 1958, p. 658-662.

Ni_2B and Co_2B are isostructural with cementite (FeC). A single-crystal structure determination of NiB has been made. Some properties of the cementite structure. 24 ref. (M26q, M21f; Co, Ni, *B,* 14-68)

584-M. (English.) **Metallic Alloys.** J. Friedel. *Nuovo Cimento, Supplemento,* v. 7, no. 2, 1958, p. 287-311.

Study of energy states, behavior of electrons and nuclei, effect of impurities for metallic alloys in general. 40 ref. (M25, M26p, 3-69)

585-M. Composition Versus Hot Strength Diagrams of Alloys of the Titanium - Vanadium - Columbium System. V. S. Vlasov and I. I. Kornilov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 7, July 1958, p. 136-139. (Henry Brutcher, Altadena, Calif., Translation no. 4346.)

Study of hot strength of Ti-rich alloys in Ti-V-Cb system. Phases present. Preparation of alloys along three radial sections from Ti corner with V/Cb ratios of 3/1, 1/1 and 1/3, respectively.
(M24c, 2-61; Ti, V, Cb)

586-M. Hexagonal Ordered Phases in the System Titanium-Aluminum and Titanium-Indium. K. Anderko. *Zeitschrift für Metallkunde*, v. 48, no. 2, 1957, p. 57-58. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. NRC-C2474.)

Previously abstracted from original. See item 169-M, 1957.
(M24; Ti, Ag, In)

587-M. Cohesive Energy of Potassium. Sam Berman, Joseph Callaway and Roger D. Woods. Miami University, Dept. of Physics. *U. S. Office of Technical Services*, PB 124594, Nov. 1955, 8 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

(M25; K)

588-M. Investigation on the Zone Theory of the Energy of Electrons in Metals. George B. Spence and Ernst Katz. Michigan University, Engineering Research Institute. *U. S. Office of Technical Services*, PB 125898, Aug. 1956, 122 p. (Available at Library of Congress, Washington, D. C.—Microfilm $6.30; Photostats $19.80.)

Theoretical investigation of certain general problems which occur in using the zone theory of the electron energy bands to determine the phase boundaries of those alloys agreeing with the Hume-Rothery electron concentration rules. (M25)

589-M. Cohesive Energy of Noble Metals. K. Kambe. Harvard University. *U. S. Office of Technical Services*, PB 126153, Apr. 1955, 12 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Cohesive energies calculated at the observed lattice spacings with the rigid ion-core assumption are 61.7 for Cu, 55.8 for Ag and 49.2 for Au in comparison with the experimental values of 81.2, 68.0 and 92.0 respectively. (M25; Cu, Ag, Au)

590-M. Problems Encountered in a Study of the Beryllium-Chromium System. George H. Schippereit. Polytechnic Institute of Brooklyn. *U. S. Office of Technical Services*, PB 127951, May 1948, 5 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

(M24b; Be, Cr)

591-M. Crystallographic Structure and Orientation of the Y′ Phase in Four Commercial Nickel-Base Alloys. J. A. Amy and W. C. Bigelow. Michigan University. *U. S. Office of Technical Services*, PB 131518, July 1957, 18 p. $.50.

Selected area electron diffraction patterns obtained from matrix precipitate particles isolated by the extraction-replica technique from aged specimens of four commercial Ni-base alloys, Inconel-X, Waspalloy, M-252 and Udimet, which contain Ti and Al as hardening agents. From these patterns the matrix particles have been conclusively identified as the gamma phase. The ordered or super-lattice struoture reported for this phase in simpler alloy systems occurs also in these complex alloys and the particles develop with a high degree of preferred crystallographic orientation relative to the matrix lattice. (M26c, M27d; Ni-b)

592-M. Intermediate Phases in the Iron-Tungsten and Cobalt-Tungsten Binary Systems. Edward C. Van Reuth. Air Research and Development Command. Wright Air Development Center. *U. S. Office of Technical Services*, PB 131627, Dec. 1957, 29 p. $.75.

Some 53 alloys examined in an attempt to verify the finding of sigma phases in Fe-W and Co-W alloy systems. Selected regions of both binary equilibrium diagrams were investigated metallographically and by X-ray diffraction. It was also found that some portions of the existing equilibrium diagrams should be changed.
(M24b; Fe, W, Co)

593-M.* (German.) **Isolating Grain Boundaries in Steel.** Hermann Schenck, Eugen Schmidtmann and Heinz Muller. *Archiv für das Eisenhüttenwesen*, v. 29, Aug. 1958, p. 479-484.

Nature of grain boundaries in iron alloys. The influence of decarburization annealing in hydrogen-steam mixtures (3-5% H_2O) upon the microscopic behavior of chemically separated components. The isolate is also investigated after removal of the base metal through chlorination or dissolving in iodide alcohol. 10 ref.
(M27f; ST)

594-M. Possible Use of Tritium in Radiographic Study of Hydrogen Distribution in Titanium and Zirconium. B. I. Bruk and G. I. Nikolaev. *Academy of Sciences of the USSR, Proceedings*, v. 116, no. 1-6, 1957, p. 825-828. (Translation by Consultants Bureau, Inc.)

Investigation of hydrogen distribution in Ti and Zr, forgings and welds by means of tritium autoradiography. 6 ref.
(M23q; Ti, Zr, EG-n43)

595-M. Strontium-Antimony System and the Heats of Formation of Compounds of Strontium and Antimony. S. A. Shchukarev, M. P. Morozova and Kan Kho-in. *Journal of General Chemistry of the USSR*, v. 27, no. 7, 1957, p. 1803-1805. (Translation by Consultants Bureau, Inc.)

The existence of the compounds $SrSb_3$, SrSb, Sr_2Sb_2 and Sr_2Sb is established in the Sr-Sb system. Enthalpies of formation found for SrSb, Sr_2Sb_2 and Sr_2Sb. 4 ref.
(M24b, P12q; Sr, Sb)

596-M.* Polishing Hard Metals Electrochemically. J. M. Dickinson. *Metal Progress*, v. 74, Oct. 1958, p. 142-144.

A new technique simplifies metallographic preparation of high-melting metals and their alloys. By simultaneous use of mechanical and electrolytic polishing, layers of worked metal are avoided and an exceptionally smooth surface is produced in a short time.
(M2Op; SGA-q)

597-M.* Better Metallographic Techniques—Polishing by Vibration. E. L. Long and R. J. Gray. *Metal Progress*, v. 74, Oct. 1958, p. 145-148.

A new technique makes it possible to polish up to 24 specimens at a time without attention by a metallographer. Surfaces are generally better than can be achieved by hand polishing. (M20p)

598-M.* Light-Figure Phenomena Revealed and Crystal Faces Developed by Chemical Etching in Copper and Alpha-Brass Crystals. Mikio Yamamoto and Jiro Watanabe. *Tohoku University, Science Reports of the Research Institutes*, v. 10, June 1958, p. 240-250.

Distinct {100}, {110} and {111} light figures were revealed in copper and alpha brass single crystals etched with 20% aqueous solution of ammonium persulphate and, in alloy crystals containing more than about 20% Zn, etched with aqua regia plus water (1:1). Crystal faces developed by etching very systematically in accordance with etching conditions and crystal composition. (M26, M20q; Cu, 14-61)

599-M.* X-Ray Study of Cold Worked Metal Single Crystals. Tomiya Sutoki and Koichi Nakajima. *Tohoku University, Science Reports of the Research Institutes*, v. 10A, no. 2, 1958, p. 77-84.

The change in reflected intensity of X-ray due to the deformation of metal single crystals of Al and Zn examined with microphotometer by using Cu-K_α radiation. In Al single crystals, a large change in the relative intensity of (111) reflections was observed with an increase of deformation, and almost saturated at a few percent elongation. The increasing rate of the relative intensity reflected from the active slip plane was larger than that from the latent slip planes. Similar results were obtained with Zn single crystals. 7 ref.
(M26, M22g; Al, Zn, 14-61)

600-M. Study of the Thorium-Uranium Alloy System. G. G. Bentle. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/706, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Resistivity and lattice parameter data complete part of the Th-U phase diagram and confirm that U causes a slight decrease in phase transformation temperature of Th and that the solubility of U in Th is less than 1% at room temperature and increases to about 7% at 1270° C. 10 ref. (M24b; U, Th)

601-M. Metallographic Studies of Uranium. T. K. Bierlein and B. Mastel. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1855, 1958, 17 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Conventional metallography, precharacterized surface metallography, and fractography used to study the nature and extent of reactor-induced microstructural changes in U. Difficulties in microstructural interpretation can be surmounted by studying relative effect of such parameters as temperature of irradiation, flux intensity, burnup by supplementary metallographic techniques. 18 ref.
(M21, M23; U, 14-70)

602-M.* (German.) **Metallographic Techniques for Different Materials.** Walter Strohfeld. *Industrieblatt,* v. 58, Oct. 1958, p. 442-446.

Summary of recent techniques; suggestions for improvement of metallographic grinding, polishing and etching. Consideration of materials; soft and hard metals, precious and nonprecious; time involved for different materials and methods; manual and mechanical procedures, combinations. Improved electrolytic polishing procedure, wet polishing and diamond polishing. Etching of rare metals; traditional etching agents and new ones. 27 ref.
(M20)

603-M.* (German.) **Surface Impression Films.** H. Mahl. *Metalloberflache,* v. 12, Oct. 1958, p. 296-301.

Surface impression films obtainable by oxidation, vapor deposition, a thin varnish coat and polymerization serve mainly for electron microscope surface tests. In a film of equal thickness at any point of the profile, the surface shape is seen under the electron microscope through the effect of inclined planes. A depression gives the same picture as an elevation. By vaporizing a heavy metal at an acute angle to the surface, a more plastic picture is obtainable. (To be continued.) (M20r, M21e)

604-M.* (Japanese.) **Structural Diagram of Acicular Cast Iron Containing Molybdenum and Copper.** Tohei Ototani, Masuteru Maruyama, Youichi Tokunaga and Mitsuo Hara. *Japan Foundrymen's Society, Journal,* v. 30, Aug. 1958, p. 603-608.

Molten pig iron containing Mo and Cu was cast in a sand mold with steps 10, 20, 30 and 40 mm. in diameter. The structural diagram for acicular cast iron having a Brinell hardness of 240 to 280 was determined by metallographic observation, thermal analysis and hardness measurements. Matrix structure depended upon the cooling rate within the temperature range of austenite and the amount of alloying elements. 10 ref.
(M27, N12, Q29n, 2-60; CI, *Cu,* Mo)

605-M.* (Russian.) **Nature of Etching Figures of Aluminum-Copper (4% Cu).** N. N. Byinov and R. R. Zakharova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 289-292.

In aging of Al-Cu (4% Cu) at 150° C. there is a connection between the hardening of the alloy and the dimensions and form of the etched figure. The etching figures, while they retain the correct form, are related to helical dislocation. Calculation was made of disorientation of mosaic blocks and the thickness of dislocation. By strengthening the alloy through aging, thickness of dislocation increases. 9 ref. (M26f, N7a; Al, *Cu*)

606-M. Stacking Faults in Close Packed Metallic Lattices. Pt. 1. The Nature and Origin of Stacking Faults. T. R. Anantharaman. *Current Science,* v. 27, July 1958, p. 238-241.

13 ref. (M26s)

607-M. Study of Metallic Carbides by Electron Diffraction. Pt. 2. Crystal Structure Analysis of Nickel Carbide. Sigemaro Nagakura. *Physical Society of Japan, Journal,* v. 13, Sept. 1958, p. 1005-1014.

13 ref. (M26r; Ni)

608-M. Studies on Surface Layer of Polished Metals by Electron Diffraction and Electrical Contact Resistance Measurements. Masahisa Matsunaga. *University of Tokyo, Institute of Industrial Science, Report,* v. 7, Mar. 1958, p. 226-252.

Studies on effects of polishing and electric resistance of surface films. 41 ref. (M26, M27, P15g, 14-62)

609-M. Structural Peculiarities of Molten Alloys in Certain Binary Systems. D. K. Belashchenko and J. V. Stalin. *Doklady Akademii Nauk SSSR,* v. 117, no. 98, 1957, p. 101. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4472.)

(M25, 14-60)

610-M. Electron Structure of Nickel and Its Alloys. G. S. Krinchik. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 36-40. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4030.)

Previously abstracted from original. See item 370-M, 1957.
(M25, P16; Ni)

611-M. Distribution of Alloying Elements Between Solid and Liquid Phases in Alloys. B. A. Movchan. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, Apr. 1958, p. 122-123. (Henry Brutcher, Altadena, Calif., Translation no. 4378.)

Microradiographic study of distribution of Ag, Cu and Zn between solid and liquid phases in binary Al alloys, segregation films at solid-liquid interface.
(M23n, N12; Al-b, *Ag, Cu,* Zn)

612-M. (German.) **Structure of the Surface Zone of Iron in the Planes (100) Treeing.** Ladislav Spacek. *Chekhoslovatskii Fizicheskii Zhurnal,* v. 8, no. 4, 1958, p. 411-415.

Dendritic structure in the surface zone detectable only within small inclination angles of the plane of observation to the plane (100). The degree of inclination depends on the size of crystals. 4 ref. (M26; Fe)

613-M. (German.) **Structure of Electrolytic Nickel Coatings of 20 to 50 Å.** H. Pfisterer, A. Politycki and E. Fuchs. *Naturwissenschaften,* v. 45, June 1958, p. 282-283.

Study of the thickness of the oxide film under the coating and its behavior in relation to the base metal based on metallographs and diffraction patterns. 6 ref.
(M26, M27, L17; Ni, 8-62)

614-M. (Russian.) **Crystal Structure of Cu and Cu Solid Solutions Influenced by Deformation.** L. N. Guseva and A. A. Babareko. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 518-520.

Structure changes studied on filings and rolled samples by measuring the width of X-ray interference lines. Results for electrolytic Cu, Cu + 3% Zn, Cu + 10% Zn, Cu + 4.6% Al and Cu + 13% Al. 8 ref.
(M26, M22g; Cu-a, Cu-b, *Zn, Al*)

615-M. (Russian.) **Structure of Melted Bismuth-Tin Alloys.** N. V. Alekseev and Ya. I. Gerasimov. *Doklady Akademii Nauk SSSR,* v. 121, no. 3, 1958, p. 488-491.

10 ref. (M25; Bi, Sn, 14-60)

616-M. Nonsaturability of the Strain Field of a Dislocation by Point Imperfections. R. Thompson. *Acta Metallurgica,* v. 6, Jan. 1958, p. 23-28.
6 ref. (M26)

617-M. Relation Between Dislocation Density and Stress. B. A. Bilby, L. R. T. Gardner and E. Smith. *Acta Metallurgica,* v. 6, Jan. 1958, p. 29-33.

Relations between the stress gradient, dislocation density and lattice curvature in twisted cylindrical bars. 21 ref. (M26)

618-M. Grain-Boundary Segregation of Phosphorus in an Iron-Phosphorus Alloy and the Effect Upon Mechanical Properties. M. C. Inman and H. R. Tipler. *Acta Metallurgica,* v. 6, Feb. 1958, p. 73-84.

Tracer technique shows segregation of P at grain boundaries of Fe-P alloy (0.09% P). Concentration of P at boundaries 50 times that within grains. 19 ref.
(M27f, M23q, Fe, P, 9-69)

619-M. Interaction Between Solute Magnesium Atoms and Vacancies in Aluminum. C. Panseri, F. Gatto and T. Federighi. *Acta Metallurgica,* v. 6, Mar. 1958, p. 198-204.

Annealing out of vacancies in quenched Al is suppressed by as little as 0.13% Mg. 13 ref.
(M26s, J23; Al-b, *Mg*)

620-M. Thermodynamic Analysis of Binary Liquid Alloys of Group II B Metals. Pt. 1. The Systems Zinc-Cadmium, Zinc-Gallium and Zinc-Tin. O. J. Kleppa. *Acta Metallurgica,* v. 6, Apr. 1958, p. 225-242.

Heat of mixing in the liquid alloys of Zn with Cd, In and Ga. Partial molal heat contents derived. 17 ref.
(M24b, P12; Zn-b, Cd, In, Ga, Sn)

621-M. Influence of Surface Energy on Thermal Etching. A. J. W. Moore. *Acta Metallurgica,* v. 6, Apr. 1958, p. 293-304.

When polished Ag is heated in air to about 900° the surface is thermally etched to give a series of parallel ridges. 23 ref.
(M20q, P12a, 2-61; Ag)

622-M. Growth and Preferred Orientations of Crystals in Tungsten Wire. G. D. Rieck. *Acta Metallurgica,* v. 6, May 1958, p. 360-366.

In recrystallized wires of doped W, large crystals have their [421] or [531] axis parallel to the wire axis and small ones tend to keep the original texture [110]. 8 ref.
(M26c; W, 4-61)

623-M. Ternary Carbides of Transition Metals With Aluminum and Magnesium. L. J. Huetter and H. H. Stadelmaier. *Acta Metallurgica,* v. 6, May 1958, p. 367-370.

In the ternary systems Mn-Al-C, Co-Al-C, Ni-Al-C and Co-Mg-C, double carbides were found in which the metal atoms occupy the points of a face-centered cubic lattice with a superstructure. 15 ref.
(M24c. M26; Co, Mn, Al, Mg, C, NM-a35)

624-M. d-Shell Interactions and the B8 (NiAs) Structure. A. J. Cornish. *Acta Metallurgica,* v. 6, May 1958, p. 371-374.

Transition from NaCl structure to the NiAs structure is explained by the direct interaction of partially filled d-shells. 9 ref. (M26; 14-68)

625-M. Theory of Order in Ternary Alloys. Pt. 1. K. F. Wojciechowski. *Acta Metallurgica,* v. 6, June 1958, p. 396-400.

Theory is a generalization of a theory of binary alloys. Thermodynamic equilibrium conditions of ternary alloys given. (M24c)

626-M. Effect of Thermal Grooving on Grain Boundary Motion. W. W. Mullins. *Acta Metallurgica,* v. 6, June 1958, p. 414-427.

Dynamics of thermal groove formation at a moving grain boundary; conditions under which movement of boundary will stop. 25 ref.
(M26f, N3, 2-61)

627-M. (German.) **Concentration Gradient of Iron-Ion Vacancies in Woostite Scaling Films and the Mechanism of Oxidation of Iron.** H. J. Engell. *Acta Metallurgica,* v. 6, June 1958, p. 439-445.

12 ref. (M26s, R1h; Fe, *O,* NM-a34)

628-M. The Influence of Lattice Defects on the Electrical Resistivity of a Gold-Copper Alloy (7 At. % Cu). B. M. Korevaar. *Acta Metallurgica,* v. 6, Sept. 1958, p. 572-579.

Lattice defects introduced in wires by quenching from 900 or 450° C. or by stretching 15% at −195 C. In the annealed state short-range order exists in the alloy, which causes an increase in resistivity at −195° C. of about 3%. This order is destroyed both by heating and quenching; it may be restored by annealing between −40° C. and 200° C., and by means of a diffusion of lattice defects. 13 ref. (M26s, P15g; Al-b, Cu)

629-M. The Formation of Cube Recrystallization Textures by <112> Slip. C. A. Verbraak. *Acta Metallurgica,* v. 6, Sept. 1958, p. 580-597.

Cu single crystals with various initial orientations were cold rolled and annealed. With increasing spread of the [112] <111> rolling texture around the most active gliding directions, the intensity of the cube texture component in the recrystallization texture increases, which is explained in terms of <112> slip. 32 ref. (M26c, Q24a; Cu, 14-61)

630-M. Pseudospirals, Imperfect Structures and Crystal Habit Produced by Field Evaporation of Metal Crystals. E. W. Muller. *Acta Metallurgica,* v. 6, Oct. 1958, p. 620-630.

Crystal surface obtained at low temperatures for W, Pt, Ir and Rh. 12 ref. (M26; W, Pt, Ir, Rh)

631-M. Twins and Phase Transitions in Sodium Tungsten Bronze. J. H. Ingold and R. C. DeVries. *Acta Metallurgica,* v. 6, Dec. 1958, p. 736-747.

A temperature range over which a twinned phase exists was found for single crystals. Phase is birefringent. 15 ref.
(M27e, N6p; Cu-s, *W, Na,* 14-61)

632-M. Equilibria Between Titanium Metal and Solutions of Titanium Dichloride in Fused Sodium Chloride. K. Komarek and P. Herasymenko. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 216-219.

Thermal analyses of $TiCl_2$ and NaCl in closed Ti metal crucibles. 7 ref. (M23r; Ti-b, *Cl*)

633-M. Equilibria in the Niobium-Hydrogen System. W. M. Albrecht, M. W. Mallett and W. D. Goode. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 219-223.

Determined at 100-900 C., 10-1000 mm. of mercury hydrogen pressure, and atomic ratios of hydrogen to columbium of 0.01-0.85. Single-phase solid solution produced. 9 ref.
(M24b; Cb, *H,* 14-67)

634-M. Recent Soviet Literature on Strength-Temperature Relation. R. W. Guard, W. R. Hibbard, Jr., and R. E. Hoffman. *Journal of Metals,* v. 10, Nov. 1958, p. 727-730.

Theories of strengthening; relation of strength of bond forces and diffusion; theories of high-temperature strength; relation of high-temperature strength to phase diagrams. 82 ref. (M25h, Q27a, 2-62; SGA-h)

635-M. Deformation Structures in Silver-Gold Alloys. R. J. Block, J. B. Cohen and M. B. Bever. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 300-301.

Lamellar structures increased with strain and decreased with temperature and Au. 4 ref.
(M28k, 2-60, 2-61, 3-68; Ag-b, *Au*)

636-M. Equilibrium Diagram of Indium-Zirconium in the Region 0-26 At. Pct. In. J. O. Betterton, Jr., and W. K. Noyce. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 340-342.

Temperature of allotropic transition rises with In, terminating in a peritectoid reaction. 7 ref.
(M24b, N11g; Zr-b, In)

637-M. Selective Identification of Constituents in Nimonic 80 by Extraction Replica Techniques. J. R. Mihalisin. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 349-350.

Relates microstructure to properties. 4 ref. (M22k; Ni-b, *Cr, Al, Ti*)

638-M. Atomic Size Effects in CrO Type Structure. M. V. Nevitt. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 350-355.

Relation of atomic size to stability, to lattice parameter of phase and to position of component elements in the periodic table. 24 ref. (M24, M25, 3-71, 3-72; Cr-b, O, NM-a34)

639-M. Autoradiographic and Metallographic Evidence for a Metallic Second Phase in High-Purity Zinc. I. S. Servi, M. Stern and W. W. Webb. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 361-366.

Second phase attributed to Pb whose solubility in Zn is less than 0.5 ppm. 8 ref.
(M24, N-general; Zn, *Pb, Po,* 9-69)

640-M. Uranium Columbium Alloy Diagram. R. A. Rogers, D. F. Atkins, E. J. Manthos and M. E. Kirkpatrick. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 387-393.

Apparatus and procedures used to obtain data for phase diagram. 10 ref. (M24b; U, Co)

641-M. The System Mercury Thorium. R. F. Domagala, R. P. Elliot and W. Rostoker. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 393-395.

Th and Hg solubility measured with 0-100% Th and temperatures up to 1000° C. (M24b, 2-62; Hg, Th)

642-M. Measurement of Grain Contiguity in Two-Phase Alloys. J. Gurland. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 452-455.

Relations between the area of contact, the dihedral angle and the mean free path of spherical grains determined by metallographic analysis. 11 ref. (M27f, M24c; Ti, C, Co, V)

643-M. Antimony Zirconium System in the Range 0 to 5 At. % Antimony. J. O. Betterton, Jr., and W. M. Spicer. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 456-457.

Solubilities of Sb in the alpha and beta forms of Zr determined at 750-1300° C. 6 ref.
(M24b, N11; Zr-b, Sb, 14-68)

644-M. Silver Zirconium System. J. O. Betterton, Jr., and D. S. Easton. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 470-475.

Two intermediate phases and eutectoid reaction. Impurities introduce deviations. 10 ref.
(M24b, N9, 3-69; Ag, Zr, 14-68)

645-M. Studies of the Iron Chromium System. R. O. Williams. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 497-502.

Neutron diffraction, electrical resistance, chemical extraction used to clarify Cr part of miscibility gap. 21 ref. (M24b, P15g, P16; Fe, Cr)

646-M. Effect of High Temperature Aging on the Development of Minor Phases in an Age Hardening Nickel-Base Alloy. W. C. Bigelow, J. A. Amy and L. O. Brockway. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 543-549.

Titanium nitride, columbium nitride, and $M_{23}C_6$ complex carbide and intermetallic gamma phases of Inconel-X alloy identified by electron microscopy and electron and X-ray diffraction. 18 ref. (M27d, N7a, 2-65, 1-66; Ni-b, *Cr, Ti, Cb, N, C, Fe, Al*)

647-M. Metallographic Studies of Metals After Explosive Shock. Cyril Stanley Smith. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 574-589.

Deformation in a shock front has a unidirectional character that dis-

tinguishes it from other modes of deformation and is in essense a transformation from normal to high-density material produced by a well-defined two-dimensional interface. 15 ref. (M27, Q24, Cu, Fe)

648-M. Layer Growth During Interdiffusion in the Aluminum-Nickel Alloy System. L. S. Castleman and L. L. Seigle. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 589-596.
22 ref. (M24b, N1e; Al-b, Ni, 14-68)

649-M. Temperature Dependence of Preferred Orientation in Rolled Tungsten. J. W. Pugh. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 637-642.
20 ref. (M26c, 2-61; W)

650-M. Texture of Cold Rolled and Recrystallized Crystals of Silicon Iron. J. L. Walter and W. R. Hibbard, Jr. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 731-737.
Texture depends on orientation of single crystal. Minor components may serve as nuclei for the recrystallizing grains. 16 ref.
(M26c; Fe-b, Si, 14-61)

651-M. Rolling and Annealing Textures of Beryllium and Hafnium Sheet. J. H. Keeler. *Metallurcigal Society of AIME, Transactions,* v. 212, Dec. 1958, p. 781-782.
6 ref. (M26c, J23, F23; Hf, Be, 4-53)

652-M. Preferred Orientation in Rolled Uranium Rods. Melvin H. Mueller, Harold W. Knott, Warren P. Chernock and Paul A. Beck. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 793-798.
Thermal cycling and thermal expansion data. Orientation developed by rolling at 300 and 600° C. 12 ref. (M26c, P11g, 2-62; U, 4-55)

653-M. Constitution of Zirconium-Uranium Alloys Containing Oxygen or Nitrogen. A. A. Bauer, G. H. Beatty and F. A. Rough. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 801-808.
Extent of the alpha plus beta Zr region at 660° C. determined. Partial Zr-U-N_2 diagram presented. 5 ref. (M24c, M24e; Zr-b, *U, O, N*)

654-M. Dislocation Configurations in Rolled Columbium. R. Bakish. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 818-820.
Etch pit configurations, deformation bands and slip lines. 4 ref. (M26b, Q24; Cb)

655-M. X-Ray Diffraction Study of the Perfection of Aluminum and Copper Crystals Grown in Solid State. M. N. Parthasarathi and Paul A. Beck. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 821-827.
Nucleation of strain annealed crystals is not based on strain induced boundary migration. 11 ref. (M26s, M22, N2; Al, Cu)

656-M. Substitutional Solid Solution Strengthening in Copper Alloys. C. D. Wiseman. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 847-852.
Shear tests, deformation, annealing of single crystals to create substructure. Interpreted by solution strengthening theories. 17 ref.
(M27b, Q2, 3-68; Cu-b, *Mn, Al,* 14-61)

657-M. Constitution of Delta Phase Alloys of the System Uranium Molybdenum Titanium. A. A. Bauer, F. A. Rough and J. Doig. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 862-868.
Delta phase relationships and inferred isothermal ternary sections. (M24c; U-b, *Mo, Ti*)

658-M. (French.) Diffraction Spots and Structure of Bent Metallic Single Crystals. A. Merlini. *Acta Metallurgica,* v. 6, Jan. 1958, p. 19-22.
(M22, M26, 3-68; 14-61)

SECTION N

TRANSFORMATIONS and RESULTING STRUCTURES

1-N. Diffusion of Uranium Through Graphite. L. D. Loch, J. R. Gambino and W. H. Duckworth. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 145-150.

Diffusion rates were determined in the range 3000 to 4350° F. The diffusion couples consisted of sintered UC_2 disks in contact with graphite rods. Two distinct types of uranium transport could be associated with volume diffusion and with migration along pores. 4 ref. (N1, 2-62; U, NM-k36)

2-N. Effect of Hydrogen Upon Martensite Formation in Low-Alloy Steels. R. Kumar and A. G. Quarrell. *Iron and Steel Institute, Journal,* v. 187, Nov. 1957, p. 195-204.

Metallographic method chosen was the quench-temper technique followed by quantitative evaluation of martensite formed in the quench by the point-counting technique of Howard and Cohen. 17 ref. (N8p, 2-60; AY, *H*)

3-N. Martensitic Reaction for Uranium. A. L. Bement and W. P. Wallace. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission,* HW-51084 Rev., June 25, 1957, 26 p.

Isothermal studies on heat treatment and microstructure of uranium. 10 ref. (N6q; U)

4-N. Precipitation Hardening and Embrittlement of High-Strength Titanium Alloys. A. J. Griest, J. R. Doig, P. D. Frost and C. M. Schwartz. Wright Air Development Center Technical Report 54-355, Pt. 3. *U. S. Office of Technical Services,* PB 121890, Nov. 1956, 90 p. (CMA)

Age-hardening behavior of a series of alpha-beta alloys of the systems Ti-Mn, Ti-Mn-Al, Ti-V, Ti-V-Al and Ti-Fe, using hardness, tensile and X-ray diffraction data. Effects of solution temperature, aging temperature and alloy composition on the aging reaction. (N7a, Q26s; Ti)

5-N. (German.) **Eutectic Crystallization Structure.** E. Scheil and R. Zimmermann. *Zeitschrift für Metallkunde,* v. 48, Sept. 1957, p. 509-516.

Three kinds of eutectic crystallization described. Occurrence of a normal eutectic structure investigated statistically with consideration of the dependence on the volume ratio of the constituents. Degeneration in the system aluminum-Al_2Cu investigated. 14 ref. (N12q; Al)

6-N. (Italian.) **X-Ray Diffraction Determination of Recrystallization Curves in Al-Mg Industrial Alloys Containing From 1.5 and 5% Mg.** M. Paganelli. *Alluminio,* v. 26, Sept. 1957, p. 353-360.

Temperatures at beginning and end of recrystallization cycle determined for four alloys subjected to varying degrees of cold working, then annealed 1 hr. and given rapid water quench. Given same degree of cold working, initial and final recrystallization temperatures decrease as Mg content increases. 6 ref. (N5, M22g; Al, *Mg*)

7-N. (Russian.) **Pearlitic Transformations in Chromium Steels Containing Columbium and Zirconium.** D. Ya. Vishnyakov and L. S. Ol'Khova. *Metallovedenie i Obrabotka Metallov,* Sept. 1957, p. 18-21. (CMA)

Observations of isothermal transformations of undercooled austenite. In samples undercooled below the upper bend of the time-temperature curve, pearlite precipitates in needles and not in its usual form. In the

part of the diagram corresponding to the upper intermediate stage of the transformation there is a supplementary curve indicating the formation of needle-like pearlite from excess austenite that did not take part in the previous transformation into needle-like troostite. 2 ref. (N8h; AY, *Cr, Cb, Zr*)

8-N. (Czech.) **Influence of Silicon and Chromium on the Position and the Range of Eutectoid Temperatures.** Stanislav Drapal. *Hutnické Listy,* v. 12, Sept. 1957, p. 769-777.

Studies on spheriodal graphite cast iron show that the formation of austenite starts with preference in middle domains of the dendrites. 10 ref. (N8; Si, Cr) (N8f, 2-60; CI-r, *Si, Cr*)

9-N. (Czech.) **Isothermal Austenite Decomposition in Tungsten Alloy Steels. Pt. 3.** Josef Cadek and Karel Mazanec. *Hutnické Listy,* v. 12, Sept. 1957, p. 777-788.

Effect of tungsten in steel containing 0.4% carbon; formation of eutectoid containing the carbide M_6C (steels with 4.3 and 9.0% W, respectively) is accompanied by increasing carbon concentration in the untransformed austenite. 24 ref. (N8g; AY, *W*)

10-N. (Czech.) **Morphology of Lamellar Pearlite in Steel Containing 2.8% Copper.** Ivan Hrivnak. *Hutnické Listy,* v. 12, Sept. 1957, p. 801-803.

Precipitation of a Cu-rich phase in steel containing 0.1% C and 2.8% Cu occurs on the boundaries of ferritic grains as a fine dispersion. 3 ref. (N8h; AY, *Cu*)

11-N. (German.) **Structure of Alloy Electrodeposits. Pt. 12. Copper-Tin Alloys.** E. Raub and F. Sautter. *Metalloberfläche,* v. 11, Aug. 1957, p. 249-252.

High-copper bronze deposits are mostly of the face-centered solid solution type, the solubility limit of which is about 10 times higher than the equilibrium. The speculum deposits consist of the delta and eta-phase of the system copper-tin, and can be transformed into the stable epsilon phase by annealing. 7 ref. (N12d, L17; Cu, Sn)

12-N. (Russian.) **Growth of Large Zinc Crystals With a Predetermined Orientation.** B. N. Bushmanov. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 310-314.

Obtaining large Zn monocrystals. Orientation of crystallographic axis can be predetermined by insertion (in the melt) of a monocrystalline Zn rod, cooled at the opposite end. 12 ref. (N12s, M26; Zn, 14-61)

13-N. (Russian.) **Volumetric Change of Carbide Phase on Tempering of Steel.** N. N. Lyulicheva. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 319-330.

Investigation on steels of a heterogeneous structure, applying methods of space metallography and using optical and electron microscopes. Hypothesis of the carbide phase structure at low tempering temperatures. 14 ref. (N8a, P10d; ST)

14-N. (Russian.) **Texture of Recrystallization of Cold Rolled, Low-Carbon Steel.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 331-338.

Development of recrystallization structure on cold rolling and deformation. Explanation of the relationship by means of model representation of the recrystallization mechanism. 15 ref. (N5, CN)

15-N. (Russian.) **Influence of Intermediate Annealing Upon Texture of Cold Rolling and Recrystallization.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 339-343.

Experimental data on transformer and low-carbon steels applying magnetometric method of measurement. 13 ref. (N5, M26c; CN)

16-N. (Russian.) **Distribution of Carbon on Transformation of Austenite in the Intermediate Zone.** L. I. Kogan and R. I. Entin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 360-368.

Investigation in respect to composition, temperature and time. 17 ref. (N8; ST)

17-N. (Russian.) **Effect of Deformation Under Low Temperature on Phase Transformations and Properties of 1X18N9T Austenitic Steels.** A. P. Gulyaev and I. V. Chernenko. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 2-7.

Transformation of austenite to martensite in strained samples at temperatures of 100 to −196°. Previously they had been quenched at 1050° in water and stabilized at 800° for 100 hr. (N8p; SS)

18-N. (Russian.) **Strain Hardening of Austenite by Reverse Martensite Transformation.** V. N. Gridnev, V. T. Cherepin and N. F. Chernenko. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 7-12.

Effect of direct and reverse martensitic transformation on mechanical properties of austenite; effect of speed of heating on kinetics of transformation and stabilization of austenite. The maximum effect of stabilization takes place after the first cycle of heat treatment. 5 ref. (N8p. Q general; ST)

19-N. (Russian.) **Some Rules Governing the Direct and Reverse Martensite Transformation.** E. L. Vinogradskaya and G. A. Kreslina. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 12-15.

The iron-base alloy studied had the following composition: 0.06% C, 13.2% Mn, 0.28% Cu, and 2.12% Co. Transformations were observed by magnetometric methods. Results were related to the change in the quantity of alpha-phase in the samples. (N8p; AY)

20-N. (Russian.) **Cold Hardening, Recrystallization and Softening of Alloyed Austenite.** L. A. Metashop and M. E. Blanter. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 15-23.

The independence of the precipitation processes is shown; dissolving of the carbide and preliminary softening of the cold hardening alloyed austenite by heating. 14 ref. (N8; AY)

21-N. (Russian.) **Effect of Preliminary Hardening on the Rate of Diffusion of Carbon in Austenite.** M. A. Krishtal. *Metallovedeni i Obrabotka Metallov,* no. 8, Aug. 1957, p. 20-21.

The hardening of steel is associated with the formation of microvoids in the formerly solid metallic matrix. These develop in consequence of the tensions associated with the martensite transformation. 5 ref. (N8p, J general; ST)

22-N. (Russian.) **Effect of the Rapidity of Crystallization on the Micro-Heterogeneity of Magnesium Alloys.** Z. A. Sviderskaya, M. E. Drits and E. C. Kadaner. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 23-29.

Many physical and mechanical properties of alloys depend on changes in the structural heterogeneity of the alloy. Heat resistance is one of important factors. Rapid, or very slow cooling, even distribution of structural components ease the process of diffusion, and to a certain degree, lower heat resistance. 12 ref. (N12; Mg)

23-N. (Russian.) **Influence of Additions to Aluminum on the Speed of Reactive Diffusion.** D. I. Lainer and A. Ya. Potemkin. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 33-35.

In the production of Al-clad Ni strip, the products of reactive diffusion exert great influence on the quality of the finished products. (N1, L22; Ni, *Al*)

24-N. (Russian.) **Nature of Martensite Transformation.** M. E. Blanter and P. V. Novichkov. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 11-14.

4 ref. (N8p; ST)

25-N.* **Microstructure and Mechanical Properties of Ti-Cu-Al and Ti-Cu-Al-Sn Alloys.** R. F. Bunshah and H. Margolin. *American Society for Metals, Transactions,* v. 51, Preprint no. 58, 1957, 22 p. (CMA)

TTT-diagrams and the mechanical properties were studied for active eutectoid Ti-base alloys. Ti-8Cu-3Al-2Sn and Ti-5Cu-3Al-2Sn had the best combination of properties when forged in the $\alpha + \beta$ field and annealed in the $\alpha + Ti_2Cu$ field at 750° C. for 24 hr. The reaction $\beta \rightarrow \alpha + Ti_2Cu$ occurs quickly and a stable structure is obtained. Good strength-ductility combinations are also possible with Ti-5Cu-3Al and Ti-8Cu-3Al. Ductility is benefited by the 2% Sn and by primary α, and harmed by ω-phase or long continuous compound paths. 9 ref. (N9, M27, Q23p, Q27a; Ti)

26-N.* **Response of an Iron-Base Alloy, Hardened With Titanium, to Various Aging Times and Temperatures.** T. W. Eichekberger. *American Society for Metals, Transactions,* v. 51, Preprint no. 60, 1957, 27 p. (CMA)

The effect of adding Ti, Mo, and V on the age hardening of commercial Ni-Cr-Fe alloy was studied in the 1100-1600° F. range for periods extending from 1-512 hr. Neither V nor Ti (below 1.3%) produce much effect. Mo above 2.25% produces hardening above 1400° F. Grain boundaries and twin lines become more definite with increases of aging temperature and time, due to heavy precipitation and within grains of 3.25% Mo specimens be-

come more apparent as the temperature increases beyond 1200° F. Other specimens not containing Mo show a different general precipitation. 4 ref.
(N7a, 2-60; Ni, Cr, Fe, *Ti, Mo, V*)

27-N.* Temperature and Rate Dependence of Strain Hardening in the Aluminum Alloy 2024-0. D. S. Fields, Jr., and W. A. Backofen. *American Society for Metals, Transactions,* v. 51, Preprint no. 61, 1957, 31 p.

Strain hardening characteristics of the Al alloy 2024-0 have been studied over a range of constant shear-strain rates and temperatures. Generally high rates of strain hardening are found at the low temperatures. Little or no strain hardening occurs at the higher temperatures. At intermediate temperatures, the shape of the stress-strain curve is strongly dependent upon strain rate. 17 ref. (N7e, 2-61, 3-67; Al)

28-N.* Magnetic Analysis of Phase Changes Produced in Tempering a High-Carbon Steel. Morris Mentser. *American Society of Metals, Transactions,* v. 51, Preprint no. 66, 1957, 36 p.

Hexagonal close-packed iron carbide was identified magnetically by a direct determination of its characteristic point of inflection at approximately 380° C. Present study showed that hexagonal carbide forms initially upon decomposition of retained austenite in the second stage of tempering, at 230° C. or lower. 28 ref. (N8a, M23a; CN-r)

29-N.* Effect of Silicon, Manganese and Iron on the Aging Characteristics of Aluminium-Copper Alloys Containing 3.0 and 4.5% Copper. A. Chitty. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 65-76.

Hardness vs. aging-time curves at 21.5, 130 and 190° C. for high-purity Al-base alloys containing 3.0 and 4.5% Cu, with separate additions of up to 2.0% Si and Mn, and up to 2.0% Fe. 23 ref.
(N7a, 2-60; Al, *Cu, Si, Mn, Fe*)

30-N.* Hardness Reversion of Dilute Aluminium-Copper and Aluminium-Copper-Magnesium Alloys. R. H. Beton and E. C. Rollason. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 77-85.

Reversion investigated in naturally aged Al-Cu-Mg alloys with Cu:Mg weight ratios of 7:1 and 2.2:1, and in both naturally and artificially aged Al-Cu alloys. 17 ref.
(N7a; Al, *Cu, Mg*)

31-N.* Hardness Reversion of Aluminium-Silver Alloys. R. H. Beton and E. C. Rollason. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 85-89.

Effect of heating "cold" age hardened Al-Ag alloys examined by means of hardness measurements. Reversion of hardness takes place in two distinct stages at different temperature levels. 16 ref.
(N7a; Al, *Ag*)

32-N.* Grain Growth in Metals With Special Reference to High-Purity Nickel. Paul Feltham. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 95-97.

Grain growth in 99.99% Ni studied in the range 700-900° C. A statistical theory for the most probable initial and instantaneous grain diameters. The validity of the theoretically desired grain growth law is investigated experimentally. 9 ref. (N3; Ni-a)

33-N.* An Investigation Into Some Aging Characteristics of Lead-Antimony Alloys, With Particular Reference to the Effect of Strain. E. J. Hooker. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 98-107.

Lead alloys containing up to 0.88% antimony were strained by amounts up to 10% after solution treatment, and the progress of aging at room temperature, 100° C. and 150° C. was determined by hardness measurements. Initial and final structures examined metallographically. 29 ref. (N7a, 3-68; Pb, *Sb*)

34-N.* Aging Characteristics of Ternary Aluminium-Zinc-Magnesium Alloys. I. J. Polmear. *Institute of Metals, Journal,* v. 86, Nov. 1957, p. 113-121.

A systematic study of a wide range of ternary Al-Zn-Mg alloys with basic Zn contents of 4, 6, and 8% and Mg contents within the range 0-3%. Hardness vs. aging-time curves were determined at regular intervals between −20 and +240° C., tests being carried out for periods of up to two years. Small quantities of Mg have a pronounced effect on the age-hardening capacity of Al-Zn alloys. 36 ref.
(N7a; Al, *Zn, Mg*)

35-N.* Recrystallization Process in Tungsten as Influenced by Impurities.

R. A. Swalin and A. H. Geisler. *Institute of Metals, Journal,* v. 86, Nov. 1957, p. 129-134.

Role of special impurity additions in W investigated by electron microscope and neutron diffraction techniques. Certain types of impurity raise the recrystallization temperature of W several hundred degrees and also possibly reduce the nucleation rate of primary grains drastically, thus allowing the entire wire to be occupied by a few large grains. High-temperature annealing results in discontinuous grain growth, with the development of a sharp (320) texture. 8 ref. (N5, 3-69; W)

36-N.* Variations of Transformation Characteristics Within Samples of an Alloy Steel. W. Steven and D. R. Thorneycroft. *Iron and Steel Institute, Journal,* v. 187, Sept. 1957, p. 15-32.

Variations in isothermal transformation characteristics existing within unforged alloy steel ingot samples and in bars and wires produced from the same ingot. Differences between transformation characteristics due to variations in intensity of microsegregation of alloying elements within the samples. 11 ref. (N8g; AY, 5-59, 4-55, 9-69)

37-N.* Diffusion Phenomena in Pressure Welding. A. G. Guy and A. L. Eiss. *Welding Journal,* v. 36, Nov. 1957, p. 473s-480s.

Width, straightness and parallelism of weld interfaces in pressure welded copper-brass specimens studied to determine diffusion processes that occur during subsequent heating and to obtain information on the transport of Zn along the weld interface. 10 ref. (N1h, K5; Cu-n)

38-N. (Czech.) **Thermodynamic Considerations on the Effect of Additions on Cast Iron Graphitization.** Stanislav Drapal. *Hutnické Listy,* v. 12, 1957, p. 683-687.

Effect of addition elements on stability of complex cementite; free combination energy used as stability criterion. Calculated that Cr and Mn would increase stability while Co and Ni would increase instability of complex cementite. 17 ref. (N8s, P12, 2-60; CI)

39-N. (Czech.) **Eutectoid Reaction. Pt. 2. Eutectoid and Pearlite Reaction in Alloy Steels.** Josef Cadek. *Hutnické Listy,* v. 12, 1957, p. 687-695.

Critical analysis of published literature on the mechanism of effects of alloying elements upon eutectoid reaction in steels. Importance of gathering data upon effects of alloying on kinetic parameters, on surface energy, on the boundary of gamma grains as well as energy of phase boundaries, carbide-austenite, ferrite-austenite and carbide-ferrite. 64 ref. (N8h; AY)

40-N. (French.) **Introduction of the Study of Diffusion.** A. D. Le Claire. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 1-17.

Thermodynamic point of view; Fick law and Darken equation, use of chemical potential; crystallographic point of view; influence of composition on the diffusion coefficient; the case of alloys with several components; the mechanism of diffusion of voids; experimental measurement of diffusion coefficients. 21 ref. (N1)

41-N. (French.) **Diffusion of Radiotracers in Solids.** K. Compaan and Y. Haven. Paper from "Diffusion in Metals". Bibliotheque Techniques Philips, p. 19-22.

Method using electric analogy for calculating diffusion coefficients from physical data. The equation giving the relation between diffusion and ionic conductivity is demonstrated. 2 ref. (N1b; 14-63)

42-N. (French.) **Relation Between Diffusion Through Grain Boundaries and Their Structure.** P. Lacombe. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 23-52.

Diffusion as a means of studying the structure of grain boundaries. Experimental methods are emphasized; importance of diffusion through grain boundaries proved directly by autoradiography. 33 ref. (N1, M27f)

43-N. (French.) **Self-Diffusion Through the Grain Boundaries of Alpha Iron.** P. Lacombe and C. Leymoine. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 53-57.

Studied with help of radioactive Fe, to 725° C. Diffusion of radioactive Fe is faster in grain boundaries. Influence of the purity of Fe is low. 12 ref. (N1d; Fe)

44-N. (French.) **Observation on Kirkendall Effect and Electrolytic Transport in Solid Alloys.** Th. Heumann.

Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 59-77.

Two kinds of Kirkendall effects; the explanation based on the movement of voids. Two examples are studied: an alloy with complete solubility (Au-Ag) and an alloy with intermetallic phases (Cu-Sb). Relation between electrolytic transport and diffusion. 13 ref.
(N1e; Au, Ag, Cu, Sb)

45-N. (French.) **Electronic Probing Microanalyzer and Its Use in the Study of the Diffusion in Metals.** J. Philibert. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 77-85.

Microanalyzer observes areas of a radius of 0.001 mm.; diffusion in Fe-Cu alloys and segregation in steels studied. 10 ref.
(N1, 1-53; Fe, Cu, ST)

46-N. (French.) **Uranium - Zirconium Diffusion in the Gamma Phase.** Y. Adda and J. Philibert. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 85-91.

Diffusion coefficients are measured on sandwich specimens with the Castain microanalyser. Evidence of the Kirkendall effect in the gamma phase. 10 ref.
(N1b; U, Zr)

47-N. (French.) **The Kirkendall Effect and Diffusion in Gold-Platinum Alloys.** A. Bolk and T. J. Tiedema. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 91-97.

Although the Au-Pt diagram includes a region of insolubility, the mechanism of the Kirkendall effect is a usual one. (N1e; Au, Pt)

48-N. (French.) **Diffusion of Interstitial Atoms.** J. L. Meijering. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 97-107.

Activation energies of the diffusion of interstitial atoms and substitutional atoms compared. Diffusion of interstitial atoms is studied with the help of its influence on internal friction. 24 ref. (N1, P13a)

49-N. (French.) **Mass-Spectrometer. Study of the Unsteady Passage of Helium Through Silicon and Germanium.** A. van Wieringen. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 107-113.

Influence of inert gases on the electric properties of semiconductors. Differences in diffusion of He through metals and semiconductors. (N1, P15; Si, Ge, *He*)

50-N. (French.) **Influence of Elastic Deformation on the Movement of Voids in Copper.** C. W. Berghout. Paper from "Diffusion in Metals". Bibliotheque Technique Philips, p. 113-115.

Voids are produced by cold working. Their precipitation is studied by its influence on electrical resistivity. Influence of deformation on the activation energy of diffusion is shown. (N1, Q21; Cu)

51-N. (Japanese.) **Recrystallization of Aluminium Alloys Containing Titanium. Pt. 2.** Satoshi Kugasa. *Japan Institute of Metals, Journal,* v. 21, July 1957, p. 443-446. (CMA)

The preliminary annealing temperature of cold rolled Al-Ti, Al-Ti-Cu and Al-Mg-Ti alloys studied for effect of varying the Ti content; microscopy and hardness testing were used. (N5, T23; Al, Ti, *Cu, Mg*)

52-N. (Japanese.) **Study of Grain Size in Aluminum Sheets.** Takashi Ikeno. *Light Metals,* v. 7, July 1957, p. 28-44.

Effect of annealing conditions and composition on recrystallized grain growth; effects of working strain and gas content on grain growth. 13 ref. (N3, N5; 2-60, 2-64, 4-53; Al)

53-N. (Book-French.) **Diffusion in Metals.** A Symposium. 124 p. 1957. Bibliotheque Technique Philips, Eindhoven, Holland. $5.25.

General introduction; influence of structural defects and grain boundaries on diffusion; theoretical importance of the Kirkendall effect and electrolytic transport; diffusion of atoms and particularly of inert gas; influence of elastic stress on diffusion. Papers abstracted separately. (N1)

54-N.* **Structural Change and Recrystallization of Hydrogen-Hardened Palladium.** Takesi Sugeno and Hideaki Kawabe. *Institute of Scientific and Industrial Research, Osaka University Memoirs,* v. 14, 1957, p. 25-35.

When Pd adsorbs hydrogen electrolytically, two face-centered-cubic phases, alpha and beta, are formed depending upon the concentration of hydrogen. The hardness of Pd increases with hydrogen concentrations in alpha phase and is constant in the beta phase. When hydrogen is discharged either thermally or

anodically, the alpha phase Pd resumes the hardness of the annealed state, whereas beta phase Pd is still in the hardened status. Microscopically, beta phase Pd has many parallel line markings, and crystallographically, these line markings are in good agreement with intersections of (111) planes and the surface plane. The hydrogen-hardened beta phase Pd recrystallizes by annealing at about 600° C. This recrystallization is not caused by ordinary nucleations and growth mechanism, which is generally found in annealing of the cold worked metals. 5 ref. (N5; Pd, *H*)

55-N.* Interstitial Diffusion of Copper in PbS Single Crystals. J. Bloem and F. A. Kröger. *Philips Research Reports,* v. 12, Aug. 1957, p. 281-302.

At temperatures $100 < T < 500°$ C., Cu can diffuse rapidly into PbS via interstitial sites. Existing cation vacancies are filled by Cu, while Cu may also be bound by S at internal surfaces (cracks, dislocations). In the presence of S in the atmospheres (H_2S), Cu does not enter the crystal; interstitial Cu already present in the crystal may be drawn out when the crystal is heated in such an atmosphere. The effect is attributed to a lowering of the thermodynamic potential of Cu by the formation of Cu_2S or CuS. 18 ref.
(N1; Cu, Pb, 14-61)

56-N.* Interstitial Diffusion of Nickel in PbS Single Crystals. J. Bloem and F. A. Kröger. *Philips Research Reports,* v. 12, Aug. 1957, p. 303-308.

Under reducing conditions, Ni may penetrate into PbS crystals at temperatures $T < 500°$ C. at which the self-diffusion in PbS is negligible; it diminishes p-type conductivity and may cause n-type conductivity with donors of a depth $E \approx 0.03$ ev. The diffusion probably takes place via the interlattice with a diffusion constant $DNi = 17.8 \exp(-22000/RT)$ cm^2 sec^{-1}. Under sulphurizing conditions (H_2S) the Ni can be drawn out of the crystal again and the original conductivity restored.
(N1; Ni, Pb, 14-61)

57-N. (French.) Dehomogenization of Carbon in a Solid Austenite Solution. Louis Colombier, Joseph Hochman and Jean Bourrat. *Comptes Rendus,* v. 245, Sept. 30, 1957, p. 1135-1138.

Radioactive carbon study. 9 ref.
(N8, M23q; ST)

58-N. (German.) Diffusion of Antimony in Silver. W. Weller. *Annalen de Physik,* v. 20, no. 1-6, 1957, p. 42-44.

Diffusion proceeds in direction of Sb to Ag. 5 ref. (N1; Sb, Ag)

59-N. (German.) Measurement of Nitrogen Escape for Pure Molten Iron in a Vacuum. R. Jaeckel and H. Junge. *Annalen der Physik,* v. 20, no. 1-6, 1957, p. 331-336.

(N16m, 1-73; Fe-a, N)

60-N. (German.) Formation of Martensite Lines in a Fe-Mn-C Alloy. A. Masin. *Bulletin de l'Academie Polonaise des Sciences,* v. 5, no. 3, 1957, p. 185-190.

(N8p; Fe, *Mn, C*)

61-N. Diffusion of Mercury in Amorphous Selenium. S. Steeb and K. H. Jürgensen. *Zeitschrift für Elektrochemie,* v. 61, June 1957, p. 763-767.

(N1; *Hg,* Se)

62-N.* Tool Steels in Service. Pt. 1. Theorectical Considerations. A. P. T. Taylor-Gill. *Iron and Steel,* v. 30, Dec. 1957, p. 631-635.

Comparison of T-T-T curves for four classes of steel; structures for service conditions; hardness range; maximum wear resistance. (To be continued.) (N8g; TS)

63-N.* Production of Ferrite in Spheroidal Graphite Cast Iron by Heat Treatment. John Gittus. *Iron and Steel,* v. 30, Dec. 1957, p. 639-641.

Ferrite is produced by the graphitization of the carbide constituent of the pearlite, a process which is retarded by the presence of minor amounts of Sn and Cu, Bi, Pb, Cr, Mn and In. (N8s, 2-60; CI-r)

64-N.* Mechanism of Formation of Banded Structures. Paul G. Bastien. *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 281-291.

The banded structure in steel is produced by chemical heterogeneity due to dendritic or small-scale segregation during the cooling of the ingot. Each element which in solid solution produces a displacement of the temperature of the upper transformation point A_3 of the steel, accompanied in some cases by a horizontal displacement of the transformation curve can give rise to a banded structure. 42 ref.
(N12; ST, 5-59)

65-N.* Low-Carbon Bainitic Steels. K. J. Irvine and F. B. Pickering. *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 292-309.

The main feature of these steels is that the normal polygonal ferrite formation is retarded so that transformation to bainitic ferrite can occur over a wide range of cooling rates. This is achieved most effectively with a ½% Mo-B base composition. The tensile strength of the steel depends to a large extent on the temperature of transformation, which is controlled by an additional alloy element. With additions of alloying elements up to about 3% it is possible to reduce the transformation temperature from 650 to 450° C. and at the same time to increase the tensile strength from 40 to 80 tons per sq. in. 15 ref. (N8m, 2-60; AY)

66-N.* Tempering of Low-Alloy Creep-Resistant Steels Containing Chromium, Molybdenum and Vanadium. E. Smith and J. Nutting. *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 314-329.

Hardness changes which occur during the tempering of a range of quenched 0.2% C steels containing up to 3% Cr, 1% V and 1% Mo have been measured. The accompanying microstructural changes were determined by preparing extraction replicas for the electron microscope; the precipitated carbides were identified by transmission electron diffraction and selected-area electron diffraction. 27 ref. (N8a, Q29n, M21e; AY, *Cr, Mo, V*)

67-N.* Recrystallized Surfaces of Aluminum Extrusions. Guy V. Bennett. *Metal Progress,* v. 72, Dec. 1957, p. 102-104.

"Cold" work at surfaces of extruded bar may nucleate recrystallization of deep surface layers, producing a layer of metal of low strength and endurance. (N5, Q general; Al, 4-58)

68-N. (Czech.) **Influence of Silicon and Chromium on Eutectoid Isothermal Transformation of Austenite in Spheroidal Cast Iron.** Stanislav Drapal. *Hutnické Listy,* v. 12, Oct. 1957, p. 899-907.

11 ref. (N8, 2-60; CI-r, *Si, Cr*)

69-N. (Russian.) **Two Mechanisms of Micro-Heterogenization of Crystals in Solid Solutions of Two-Phase Alloys.** V. M. Glazov and G. A. Korolkov. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 18-23.

The two mechanisms are evident in the phase diagram at the saturation point at the eutectic temperature. 6 ref. (N12p, M24)

70-N. (Russian.) **Method of Carbide Formation During Annealing of Carbon Steel.** B. A. Apaev. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 23-24.

The dependence of carbide development on the carbon content of steel is conditional on the formation of martensite. Possibly it is connected with the distribution of carbon which is formed in the gamma solution during the cooling process. (N8r, J23; CN)

71-N. (Russian.) **Structural Changes in Cemented Carbides on Heating.** P. K. Mikhailova. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 45-48. (Also *Henry Brutcher Translation* no. 4045, Altadena, Calif.)

Size of tungsten carbide grains changed while being heated to 800-1000° C. (N3, 2-62, 6-19; W, Co)

72-N. Prevention of Segregation in the Solidification of Steel by Treatment With Rare-Earth Elements. V. M. Tageev and Yu. D. Smirnov. *Stal',* v. 17, no. 9, 1957, p. 823-828. (Henry Brutcher Translation no. 4060, Altadena, Calif.)

Previously abstracted from original. See item 390-N, 1957. (N12, 2-60; ST, AD-p, EG-g)

73-N. Effect of Prior Partial Transformation of Austenite on Subsequent Isothermal Transformation at Lower Temperatures. H. J. Hucek. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 121189, Sept. 1955, 35 p. $1.

(N8g; ST)

74-N.* Continuous Cooling Transformation Characteristics of Three Types of Weld Metal. E. F. Nippes and E. C. Nelson. *Welding Journal,* v. 37, Jan. 1958, p. 30s-36s.

Transformation diagrams for Types 180, 230 and 260 weld metals. Differences in transformational behavior and microstructure discussed in terms of alloy content. 4 ref. (N8; ST, 7-51)

75-N.* Certain Aspects of the Recrystallization of Lead and Dilute Lead Alloys. J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 155-161.

Conditions under which commercial leads similar to those used for water pipes may recrystallize in manufacture or service to give undesirable heterogeneous structures. Effects of extrusion temperature, of

water quenching and of the composition of Pb have been determined; methods of avoiding deleterious structures are indicated. The recrystallization behavior of Pb containing small alloying additions has been examined to determine which material is least susceptible to the formation of heterogeneous structures. 14 ref.
(N5, 2-60, 2-61, 2-64; Pb)

76-N.* (Italian.) **On the Solubility of Aluminum and Silver in Silicon.** V. Gottardi. *Metallurgia Italiana,* v. 49, Oct. 1957, p. 721-724.

Solubility was determined by spectrographic analysis of hypereutectic crystals of Si separated from binary alloys after growth induced by heat treatment. Temperature-eutectic composition curves obtained for Ag-S; system differed somewhat from those proposed by other authors. 11 ref. (N12; Al, Ag, Si)

77-N.* (Russian.) **Carbide Transformations on Tempering of Steel.** V. G. Permyakov and M. V. Belous. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 490-499.

Investigation of carbide transformation of carbon and silicon steels on tempering using magnetic, differentional method. Low-temperature tempering Curie point was found to be 380° C. Relationship between steel magnetization change on tempering and composition of low-temperature carbide. Composition of the carbide of Si steel was approximately Fe_2C. Specific magnetization of the carbide was 100-110 gauss per cu. cm. per g. 21 ref.
(N8a; ST)

78-N. (Russian.) **Investigation of Carbide Phases of Tempered Carbon Steel.** N. V. Gubkova, E. I. Levina and V. A. Tolomasov. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 500-504.

12 ref. (N8a; CN)

79-N. (Russian.) **Mechanism of Zinc Monocrystal Formation Applying Zone Melting Method.** V. N. Rozhanski, N. V. Dekartova and I. A. Bakeeva. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 527-530.

4 ref. (N12, C28k, 14-61; Zn)

80-N. (Russian.) **Microstructure Study of Supercooled Austenite Decomposition in Magnesium-Treated Cast Iron Containing Spheroidal Graphite.** D. Sh. Frolov and A. N. Mirza. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 4-9.

3 ref. (N8s, M27, 2-63; CI-r, Mg)

81-N. (Russian.) **Pearlitic Transformation in Chromium Steel Containing Columbium and Zirconium.** D. Ya. Vishnyakov and L. S. Olkhovoi. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 18-21.

(N8h; SS, *Cb, Zr*)

82-N. (Russian.) **Determination of Amount of Martensite Formed in Presence of Two Ferromagnetic Phases in the Alloy.** F. A. Bogachev. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 921-924.

Examination of Fe-Ni and Fe-Ni-Co alloys. 6 ref.
(N8p, M23; Co, Fe, Ni)

83-N.* **Effects of Aging and Straining on the Internal Friction of Hydrogen Charged 1020 Steel at Low Temperatures.** L. C. Weiner and M. Gensamer. *Acta Metallurgica,* v. 5, Dec. 1957, p. 692-694.

Aging at room temperature or previous straining of hydrogen-charged 1020 steel causes an internal friction peak at 105° K. to appear, reach a maximum, decrease and finally disappear. This peak has been explained by a model which involves the dragging along of hydrogen atmospheres by oscillating dislocations. Another peak at 50° K. has been observed which is apparently due to stress-induced diffusion of interstitial hydrogen. 10 ref.
(N7e, Q22; CN, *H*)

84-N.* **Recrystallization During Creep of Prestrained Aluminum.** J. H. Auld, R. I. Garrod and T. R. Thomson. *Acta Metallurgica,* v. 5, Dec. 1957, p. 741-746.

Dependence of recrystallization time on the applied stress during creep of both lightly and heavily prestrained Al. The time for the onset of recrystallization increases progressively with increasing creep stress. Some suggestions, based on the structural changes produced during creep, are advanced to account for the manner in which this incubation time varies with applied stress and degree of prior deformation. 18 ref. (N5, Q3; Al)

85-N. **High Strength Without Heat Treatment.** *Design Engineering,* v. 3, Dec. 1957, p. 37-40.

Frontier 40-E, an aluminum alloy with Zn, Mg, Cr and Ti, attains properties of great strength, light

weight, shock resistance on aging at room temperature or on adjacent aging at low temperatures. (N7a, Q general; Al, *Cr, Mg, Ti, Zn*)

86-N.* Carbide Precipitation in Several Steels Containing Chromium and Vanadium. Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 9-15.

Tempering of several steels with the basic composition 0.2% C, 9% Cr studied using electron microscopic, X-ray and electron diffraction methods. The maintenance of hardness in the range 250-400° C. is shown to result from the stability of the fine cementite precipitate, a consequence of the high Cr content of the steels. Examination of extraction replicas in the electron microscope shows that between 400 and 550° C. the cementite redissolves in the ferrite and CrC is separately nucleated initially as a very fine precipitate (< 50 Å). 15 ref. (N7; AY, *Cr, V*)

87-N.* Transformation Kinetics and Mechanical Properties of Zr-Mo Alloys. R. F. Domagala, D. W. Levinson and D. J. McPherson. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1191-1196. (CMA)

TTT-curves were established for sponge-base Zr alloys with 1.3, 3.3, 5.4 and 7.5% Mo. The noses at 600-650° C. are moved to longer times with increasing Mo content. Resistivity measurements were the basis of the study. Tensile and impact test bars were obtained both as isothermally quenched and as quenched and reheated. The 1.3% Mo alloy showed the best mechanical properties. Others showed a brittle behavior regardless of heat treatment. The formation of omega-phase is implicated in this behavior. 9 ref. (N6n, Q general; Zr, *Mo*)

88-N.* Phase Transformation in Hypoeutectoid Ti-Cr Alloys. H. I. Aaronson, W. B. Triplett and G. M. Andes. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1227-1235. (CMA)

The proeutectoid alpha and eutectoid reaction of Ti-7.22Cr were studied in the 550-725° C. range. The ubiquitous grain boundary allotriomorphs are never the dominant morphology at late reaction times, as are Widmanstaetten dideplates above 675° C. (crystals are often degenerate). Below 650° C. intragranular plates are the dominant morphology. $TiCr_2$ crystals nucleate at alpha-beta boundaries at alpha allotriomorphs and plates, are engulfed by the growth of alpha and then nucleate at interphase boundaries, resulting in the further growth of alpha crystals. 15 ref. (N9; Ti, Cr)

89-N.* Formation of Intermetallic Layers in Diffusion Couples. L. S. Castleman and L. L. Seigle. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1173-1174.

Note on existence of delta and epsilon phases in Al-Ni system as indicated by presence of intermediate layer formation with diffusion couples. Need for caution in applying diffusion couple technique to systems in which low-melting components are formed in conjunction with high-melting components. (N1e; Al, Ni)

90-N.* Some Characteristics of the Martensite Transformation of Cu-Al-Ni Alloys. C. W. Chen. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1202-1203.

Transformation of phase beta sub 1 in Cu alloy containing 14.5% Al and 0.5 to 3.0% Ni studied metallographically with the aid of motion pictures. Gamma prime transformation began at 10° C. Reproducibility of martensite transformation. Effect of strain on transformation behavior. 8 ref. (N6q; Cu, *Al, Ni*)

91-N.* Approximate Method for Calculations Using Concentration-Dependent Diffusion Coefficients. A. G. Guy, M. Golomb and A. S. Yue. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1204-1206.

Approximate method permits a correction to be made for variation of diffusion coefficient with concentration using equations that apply for constant diffusion coefficient value. Method illustrated by use of Cu-Zn system for which time to reach steady state conditions was estimated within 20%. Also allows development of concentration distribution curves describing diffusion into semi-infinite solid with comparable accuracy to actual variation of diffusion coefficient with concentration. 6 ref. (N1b)

92-N.* Diffusion of the Elements of the 1B and 11B Subgroups in Silver. A. Sawatzky and F. E. Jaumot, Jr. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1207-1210.

Data on diffusion of Cu and Hg in single crystals of Ag. Present and previous data indicate activation energies for diffusion of atoms of a given subgroup into the same solvent or similar, but frequency factors differ. Atomic size does not affect activation energy provided solid solutions are formed. 10 ref. (N1, P13a; Ag, 14-61, *Cu, Hg*)

93-N.* Mechanism of Precipitation in a Cu-2.5% Fe Alloy. J. B. Newkirk. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1214-1220.

Precipitation process in a Cu alloy containing 2.5% Fe studied experimentally by X-ray diffraction, hardness measurements, light and electron observations. Gamma Fe and alpha Fe precipitate simultaneously, with gamma Fe dominating in the early stages. During later stages the particles of gamma Fe dissolve providing the Cu lattice with Fe atoms which diffuse to the more stable alpha Fe particles. 20 ref. (N7b; Cu, *Fe*)

94-N. Nature of the Ni-Cr System. Robin O. Williams. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1257-1260.

Nickel-chromium alloys containing between 16 and 60% Ni were examined by X-ray diffraction and metallographic techniques for the purpose of determining nature of aging in terminal solid solutions and the nature of the phase diagram. Information was obtained on terminal solid solubilities in Ni and Cr systems. Rate and mode of precipitation during cooling. 8 ref. (N7, M24b, Ni, Cr)

95-N.* Growth of Iron Alloy Single Crystals From the Melt. R. C. Hall. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1267-1268.

Apparatus for growing single crystals of Al-Fe alloys above 1% Al, and Si-Fe alloys above 3% Si. Consists of pointed crucible with molten metal charge which is slowly lowered through heated zone into cooler zone. Single crystal nucleates at bottom and grows through charge. 5 ref. (N3r, 1-53; *Al, Si,* Fe)

96-N. Some Internal Friction Studies in Columbium. R. W. Powers and Margaret V. Doyle. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1285-1288.

Diffusion of carbon in columbium investigated by internal friction measurements. At 1 cycle per sec. the damping peak arising from stress-induced ordering of C in Cb was found at 268° C. while the nitrogen peak was at 285° C. Activation energy and diffusion coefficients were calculated for C and N in Cb. 19 ref. (N1, Q22; Cb, *C, N*)

97-N. Diffusion of Hydrogen Through Palladium. A. S. Darling. *Platinum Metals Review,* v. 2, Jan. 1958, p. 16-22.

15 ref. (N1c; Pd, *H*)

98-N.* (English.) Study on the Diffusion of Carbon in Gamma Iron by Internal Friction Method. Ke T'ing-sui and Yang Pen-wei. *Scientia Sinica,* v. 6, Aug. 1957, p. 623-632.

In gamma-iron (containing 1.7% Mn), an internal friction peak was observed around 240° C. with a frequency of vibration of about 2 cycles per sec. The height of the peak increased with an increase of the carbon content and decreased when the specimen was annealed at an elevated temperature. The activation energy associated with this peak was found to be 34,000 ± 2000 cal. per mol which is close to the activation energy of diffusion of carbon in gamma-iron determined in macrodiffusion experiments. It is concluded that the observed internal friction peak is associated with the stress-induced diffusion of carbon in gamma-iron. 11 ref. (N1e, Q22, P13a; Fe, *C*)

99-N* (Dutch.) Crystalline Structure in the Recrystallization of Metals. W. G. Burgers and T. J. Tiedema. *Metalen,* v. 12, Nov. 30, 1957, p. 458-464.

Grain boundary has a "structure" dependent on the mutual orientation relationship of the continuous grains. The influence of the orientation relationship between two adjacent grains on the grain boundary energy is illustrated by the equilibrium positions of the boundaries when heating a specimen of three crystals with pre-chosen orientation. Large grain growth at the expense of surrounding smaller grains, inclusion in a metal crystal and a possible nucleation process involving the polygonization of local curvatures present in the original deformed matrix are explained with a grain boundary dislocation model. 12 ref. (N5, N3)

100-N.* (Italian.) X-Ray Diffraction Determination of Recrystallization

Curves of Aluminum as Function of Purity. M. Paganelli. *Alluminio,* v. 26, Dec. 1957, p. 517-523.

Specimens of Raffinal, AP-8, AP-5 and AP-0 were subjected to varying degrees of cold working, then annealed for 1 hr. For low degrees of cold working final temperature of recrystallization increased with decrease in purity of specimen; opposite was true for high degree of cold working. 6 ref.
(N5, Q24, 1-67, M22g; Al)

101-N. (Japanese.) **Effects of Low-Temperature Deformation on Recovery Phenomena of Aluminum.** Jiro Wada, Masanobu Sasagawa and Shigeo Kobayashi. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 10-20.

10 ref. (N4, M27c, 2-63; Al)

102-N. (Japanese.) **Study of Grain Size in Aluminum Sheets. Pt. 5.** Takashi Ikeno. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 21-28.

(N3, N5; Al, 4-53)

103-N. (Japanese.) **Effect of Anodic Oxidation Treatment on Grain Size in Aluminum Sheets. Pt. 6.** Takashi Ikeno and Chogo Keiji. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 29-37.

6 ref. (N3, L19; Al, 4-53)

104-N. (Japanese.) **Study of Aging of Aluminum Alloy by Means of Specific Volume Analysis.** Takuichi and Shigeo Zaima. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 42-49.

Specially prepared samples of Al alloys were weighed on a precision chemical balance before and after aging. 8 ref. (N7a, P10d; Al)

105-N. (Japanese.) **Relationship Between Strength and Structure of Hot Drawn Aluminum Alloy Bars.** Hiroshi Asada, Kiehizo Koike and Saburo Morimoto. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 21-28.

Hot drawing did not affect high-strength property of extruded Al bars but strength was affected by size of substructure. In cold drawing, tendency of recrystallization temperature was to increase. 23 ref.
(N5, Q27a; Al, 4-58)

106-N. (Japanese.) **Studies on Aluminum-Magnesium Casting Alloys. Pt. 5.** Yasuji Nakamura. *Light Metals, (Tokyo), v.* 7, Nov. *1958,* p. 48-55.

Solubility effects of Si in the region of higher Mg content. 7 ref.
(N12p; Al, *Mg, Si,* 5)

107-N. (Czech.) **Methods of Diffusion Study by Radioactive Isotopes.** Josef Cadek and Emîl Janda. *Hutnické Listy,* v. 12, Nov. 1957, p. 1008-1020.

Methods of measuring diffusion coefficient, particularly those using radioactive isotopes. 55 ref.
(N1, 1-59)

108-N. (French.) **Intergranular Diffusion in Metals.** Georges Cizeron. *Métaux, Corrosion, Industries,* no. 385, Sept. 1957, p. 315-332.

Intergranular self-diffusion is studied by diffusion of radio tracers, measurement of grain growth and by interpretation of several phenomena. Influence of orientation of the grains and impurities. 59 ref. (N1d, 1-59)

109-N. (German.) **Structure Analyses of Alloy Steels With High Content of Carbide Forming Components.** Angelica Schrader, Adolf Rose, Leo Rademacher and Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 461-468.

The transformation process in the pearlite phase was investigated on two steels. Optic and electron microscope as well as electrochemical and revolving crystal X-ray examinations were carried out. The disintegration of austenite and the formation of various eutectoid carbide phases explained. Crystal forms are analyzed and new interpretations offered for electron diffraction diagrams. 6 ref.
(N8, M22h; AY)

110-N. (German.) **Influence of Carbon Content on the Disintegration of Austenite and Related Reactions.** Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 469-481.

Under the assumption that carbon has a definite influence on the formation of the phases at temperatures below the pearlite point, experiments were carried out on six steels with carbon contents from 0.16 to 1.02%. The transformation velocity in the pearlite phase is proportional to increasing carbon content. This phenomenon is evident in phases just below the pearlite point, where the transformation velocity for ferrite is increased with decreasing carbon content. At still lower temperatures the transformation velocity is slowest in the middle range of carbon content. 17 ref.
(N8, 2-60; ST, *C*)

111-N. (German.) **Influence of Low Carbon Content on the Recrystallization of Iron.** Frank Haessner and Paul Schwaab. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 583-590.

Primary recrystallization and grain growth observed on cold rolled sheets from high-purity iron. Influence of 0.006% C and 0.0015% C using thickness reduction, annealing temperature and annealing time as variables. Higher carbon reduced the area of recrystallization and the recrystallization temperature. Carbon also influences rate of nucleation and speed of nuclear growth. After primary recrystallization, grain growth slows down and finally stops. The final grain size is independent of both temperature and sheet thickness. 26 ref.
(N5f, N3m, 2-60; Fe-a, *C*)

112-N.* (German.) **Effect of Austenitizing Conditions on the Structure and Behavior of Plain Carbon Steels During Transformation.** Heinz Borchers and Günter Saur. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 40-46.

Survey of the literature on effect of annealing temperature and time on ferrite grain size, austenite grain and network and their relationship. Relationship between annealing time and temperature in austenitizing, cooling rate, carbon content, grain size, structure and undercooling. Tests on plain carbon steels, 0.1 to 0.35% C; determination of structure after isothermal transformation. 45 ref. (N8; CN)

113-N. (Russian.) **Transformation of Cementite Into Austenite and Ferrite Upon Graphitization and Decarburization of Cast Iron.** K. P. Bunin and S. N. Ivanov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 2-4.

Mechanism of cementite transformation with possibility of solid solution formation within the cementite phase. (N8f, N8s; CI)

114-N. (Russian.) **Peculiarities of Change of Properties of Austenitic Steel 10X25H20.** V. I. Prosvirin and L. F. Chernov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 5-12.

Growth of austentic grain and hardness increase in respect to time at 1200 and 1300° C. on subsequent aging at 650 and 750° C. Change of mechanical properties of the steel upon heat treatment. Kinetics of steel brittleness at elevated temperatures.
(N3, Q29n, Q26s, 2-64, 2-65; AY)

115-N.* **Certain Aspects of the Recrystallization of Lead and Dilute Lead Alloys.** J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 155-161.

Conditions under which commercial leads similar to those used for water-pipes may recrystallize in manufacture or service to give undesirable heterogeneous structures. Effects of extrusion temperature, of water quenching and of composition of the lead; methods of avoiding deleterious structures. Recrystallization behavior of Pb containing small additions of Cu, Sb, As, Cu, plus Ni, Cu plus Ag, and Cu plus Te. 14 ref. (N5, 3-70, 2-60; Pb)

116-N.* **Diffusion of Uranium Into Aluminum.** T. K. Bierlein and D. R. Green. *Nuclear Science and Engineering,* v. 2, Nov. 1957, p. 778-786.

The maximum penetration in the range 200-390° C. investigated. The maximum values for the penetration coefficient are 0.075, 0.50, and 6.1 $\times 10^{-6}$ sq. in. per hr. at 200, 250, and 390° C., respectively; the corresponding activation energy is 14,300 cal. per mole. Cathodic vacuum etching to obtain clean specimen surfaces prior to the diffusion anneal. Couples prepared in the temperature range investigated fracture by the application of tension between the Al and the adjacent U-Al diffusion zone interface. Subsequent measurement of the maximum U-Al peak heights above the initial U-Al interface assures a maximum value of the penetration coefficient. The investigation provides a basis for interpreting the effect of irradiation on the diffusion rates. 7 ref.
(N1b, N1h; U, Al)

117-N. Processing 310 Stainless Minimizes Carbides. Hiram Brown. *Steel,* v. 142, Jan. 27, 1958, p. 72-73.

Prestraining test sheets, then stress-relieving at 1000 to 1400° F. before solution heat treatment precipitates carbides within the grains rather than at grain boundaries, thereby permitting easier solution of carbides by the use of normal solution temperature. (N7; J1a, J27a; SS)

118-N.* **Phase Transformation in Metals and Their Influence on Mechanical Properties.** T. A. Read. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 196-215.

Precipitation from solid solution, pearlite and bainite formation, martensite reaction and their relationship to crystal structure imperfections and their influence on mechanical properties. 10 ref.
(N general, Q general)

119-N.* (English.) **Role of Interfacial Energy During Solid State Phase Transformations.** Mats Hillert. *Jernkontorets Annaler,* v. 141, Nov. 1957, p. 757-789.

Calculation of changes of equilibrium at curved interfaces between two crystals due to interfacial energy. Evaluation of composition and size of critical nucleus from free energy. Application on formation of nuclei from supersaturated solutions. Growth of a new phase and of an aggregate of two new phases from a parent phase. 24 ref.
(N2, N8, P13h; ST)

120-N. (Hungarian.) **Structural Diagrams of Cast Iron.** Nandor Hajto. *Kohaszati Lapok (Ontöde),* v. 12, Nov. 1957, p. 211-222.

Metallurgical and technological factors determining the structure of castings. 25 ref. (N8; CI)

121-N. (Norwegian.) **Diffusion in Binary Alloys.** O. J. Kleppa. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 17, no. 4, 1957, p. 53-58.

Quantitative treatment of diffusion and tracer diffusion. Determination of the relation between chemical and tracer diffusion. 22 ref.
(N1e, 1-59)

122-N. (Russian.) **Influence of Oxidation Upon Graphite Formation in Cast Iron.** K. P. Bunin, G. Z. Kovalchuk and S. A. Fedorova. *Liteinoe Proizvodstvo,* July 1957, p. 15-16.

Investigation of cast iron annealing in reducing and oxidizing environment. Rate of graphitization was considerably increased by annealing of cast iron with simultaneous oxidation. 15 ref. (N8s, J23; CI)

123-N. (Russian.) **Austenitic Cast Iron With Spheroidal Graphite.** F. N. Tavadze, I. A. Bairamishvili and D. V. Khantadze. *Liteinoe Proizvodstvo,* July 1957, p. 16-17.

Cast iron modified with Mg introduced as Ni-Mg alloy results in formation of graphite in a spheroidal form with good mechanical working properties of the product. 5 ref.
(N8s, E25q, Q general; CI, *Mg*)

124-N. (Russian.) **Formation of Graphite in Cast Iron During Crystallization and Heat Treatment.** K. P. Bunin. *Liteinoe Proizvodstvo,* Oct. 1957, p. 15-18.

Graphitization on crystallization and after solidification. 68 ref.
(N8s; CI)

125-N.* **Processes Occurring on Metal Surfaces During Cathode Sputtering.** G. V. Spivak, V. E. Iurasova, I. N. Prilezhaeva and E. K. Pravdina. *Academy of Sciences of the U.S.S.R., Bulletin, Physical,* v. 20, no. 10, p. 1075-1081. (Columbia Technical Translations.)

Ionic etching aids investigations of structure of metals and alloys. 13 ref. (N15g, M20q)

126-N. **Role of Phosphorus in Aging of Normalized Steels.** T. V. Cherian and N. J. Wadia. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 83-93.

17 ref. (N7a, 2-60; Q29n, ST, *P*)

127-N. **Effect of Silver on the Recrystallization Temperature of Electrolytic Copper.** E. R. Chandrasekhar. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 95-102.

4 ref. (N5, 2-60; Cu-a, *Ag*)

128-N. **Effects of Titanium on Aging Characteristics of Aluminum Copper Alloys.** A. K. Chatterjee and G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 181-185.

Alloy with 2.1% Cu and 0.4% Ti shows good hardening. 8 ref.
(N7a, 2-60; Al, *Cu, Ti*)

129-N. (German.) **Influence of Chemical Composition and Structure on Behavior of Hydrogen in Iron and Steel.** W. Wichmann. *Neue Hütte,* v. 2, Oct. 1957, p. 618-620.

(N1c, 2-60, 3-71; CI, ST, *H*)

130-N.* (German.) **Hydrogen in Iron and Its Behavior.** Michael Smialowski. *Neue Hütte,* v. 2, Oct. 1957, p. 621-626. (Henry Brutcher, Altadena, Calif., Translation no. 4082.)

Dilatation effects; diffusion coefficient at room temperature, influence of "layer of bubbles" on values of coefficient. Form of hydrogen in iron lattice. 28 ref. (N1c; Fe, H)

131-N. (German.) **Solubility of Gases in Nonferrous Metals.** Wilhelm Hofmann and Jürgen Maatsch. *Neue Hütte,* v. 2, Oct. 1957, p. 648-650.

Solubility of oxygen and hydrogen in Cu, Pb, Zn; behavior at melting point; porosity. 14 ref.
(N15d, P12e, Cu, Pb, Zn, *O, H*)

132-N. (Russian.) **Some Characteristics of Diffusion of Magnesium in High-Strength Iron.** I. L. Mirkin and E. P. Rikman. *Liteinoe Proizvodstvo,* Dec. 1957, p. 13-16.

Various instruments and methods in studying microstructure of mag-

nesium iron showing a laminated crystalline rather than uniform structure. 8 ref.
(N1c, M27, 1-53, 1-54; Fe, *Mg*)

133-N.* Nature of Strain-Age Embrittlement. C. J. Osborn. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 97-101.

Embrittlement which occurs in steel during aging after plastic deformation can be studied conveniently by means of a notched-bar test. Curves showing the progress of embrittlement with time of aging a low-carbon iron at 30 and 80° C. closely resemble the corresponding strain-age hardening curves; it is suggested that both embrittlement and hardening are due to the same basic process. The activation energy for strain-age embrittlement is calculated to be of the order of 20,000 cal per mole, which is the same as for strain-age hardening. 16 ref.
(N7e, Q26s; CN-g)

134-N. (English.) **Studies on the β-ε Transformation in Cobalt-Nickel Alloys. Pt. 1. Propagation Process of the Transformation.** Sakae Takeuchi and Toshio Honma. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 9, Dec. 1957, p. 492-507.

Optical microscopic study of transformation of the face-centered cubic into the close-packed hexagonal phase in Co and its alloys; process of growth of relief marking and its relation to the inner structure of transformed phase.
(N6p, M21e; Co, Ni)

135-N. (English.) **Studies on the β-ε Transformation in Cobalt-Nickel Alloys. Pt. 2. Microstructure of Transformation Relief.** Sakae Takeuchi and Toshio Honma. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 9, Dec. 1957, p. 508-519.

Mechanism of propagation of the face-centered cubic→close-packed hexagonal lattice transformation in Co-Ni alloy from the observation of the microstructure of relief, working with electronic microscope. 8 ref. (N6p, M21e; Co, Ni)

136-N. (English.) **Diffusion of Sulphur in Liquid Iron. Pt. 2. Diffusion in Liquid Iron Saturated With Carbon.** Yasuji Kawai. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 9, Dec. 1957, p. 520-526.

Diffusion coefficient was measured in 1390-1560° C. temperature range by using radioactive sulphur S^{35}. 10 ref. (N1a; Fe, *S,* 14-60)

137-N.* (French.) Influence of Heterogeneous Stresses on the Allotropic Transformation of Cobalt. Herve Bibring and Francois Sebilleau. *Comptes Rendus,* v. 245, Dec. 16, 1957, p. 2269-2271.

Specimen of pure, polycrystalline Co, previously polished, of hexagonal structure, was heated under vacuum to 500° C., at which point oxygen introduced into the vacuum chamber caused formation of an oxide film. After cooling to hexagonal state, oxide film exhibited appearance of a twinned cubic crystal. Film was removed and surface of metal again attacked, after which original hexagonal grain only was found. These phenomena suggest that under normal conditions transformation nuclei in Co are few, that heterogeneous stresses provoke multiplication of nuclei. Intentionally created quenching and cold working stresses favored nucleation, cubic crystal of the alpha phase gave rise to numerous disoriented hexagonal regions. (N6p, 3-66; Co)

138-N.* (French.) Presentation of a Phenomenon of Regeneration of a Single Crystal of Alpha Iron Due to Preservation of Nuclei During Allotropic Transformation (Alpha-Gamma-Alpha). Gerard Donze and Rene Faivre. *Comptes Rendus,* v. 245, Dec. 16, 1957, p. 2277-2280.

When a crystal of alpha iron containing impurities such as carbon and nitrogen is heated a little above its transformation temperature, it possesses the curious property of being regenerated upon cooling. Phenomenon is explained by assumption that nuclei of alpha iron are preserved in polycrystalline structure of gamma iron. 5 ref.
(N6p, N2; Fe, 14-61)

139-N. (French.) **Influence of Heat Treatment on the Aging of Pure Iron After Tempering and Deformation.** Bernard Migaud and Jean Talbot. *Comptes Rendus,* v. 245, Dec. 16, 1957, p. 2282-2284.

(N7a, 2-64; Fe-a)

140-N. (French.) **Establishment of Equilibrium Diagrams of Binary Alloys by Experiments in Intermetallic Diffusion. Application to the Uranium-Zirconium System.** Jean Philibert and Yves Adda. *Comptes Rendus,* v. 245, Dec. 23, 1957, p. 2507-2510.

(N1a, M24b; U, Zr)

141-N. (French.) **Growth of Large Perfect Crystals of Alpha Uranium Resulting From Cold Working and Annealing of Polygonized Monocrystals Produced by Phase Transformation.** Jean Mercier, Daniel Calais and Paul Lacombe. *Comptes Rendus,* v. 246, Jan. 6, 1958, p. 110-113.

8 ref. (N3r; U)

142-N.* (French.) **Study of the Kirkendall Effect and Determination of Coefficients of Chemical and Self-Diffusion in a Uranium-Molybdenum Couple.** Yves Adda and Jean Philibert. *Comptes Rendus,* v. 246, Jan. 6, 1958, p. 113-116.

Coefficients of chemical diffusion were determined at temperatures from 800 to 1050° C., and variations were plotted against concentration. Coefficients of self-diffusion were then calculated. Quantitative study was made of a clearly observed Kirkendall effect in the cubic centered phase of the U-Mo couple. 6 ref. (N1d; U, Mo)

143-N. (German.) **Hydrogen Solubility in Alloys.** H. Witte. *Neue Hütte,* v. 2, Dec. 1957, p. 749-756.

24 ref. (N15d, P12s, P12e, *H*)

144-N.* (Japanese.) **Grain Control of Low-Carbon Killed Steels.** Toyosuke Tanoue. *Sumitomo Metals,* v. 9, July 1957, p. 139-142.

Steels with up to 0.018% Al examined. No correlation between Al content and mean size of grain, but normality of grain distribution varied with Al content. Steels with less than 0.004% of soluble Al had normal grains, but those with more had mixed grains. Coarse steel making necessitates a limitation of Al content to under 0.004%. Fully killed steel requires silicon content over 0.20%. (N3, 2-60; CN-g, *Al*)

145-N.* (Japanese.) **Recrystallization and Aging of Aluminum-Beryllium Alloy.** Shiro Terai. *Sumitomo Metals,* v. 9, July 1957, p. 166-184.

Effects of Be on high-purity Al and alloys varied with presence of Fe and Si as impurities. Cast structures were refined; recrystallization temperature reduced for Al and Al with 1.2% Mn alloy. Grain size refined; alloys showed split aging effect, increased with Si, decreased with Cd. 20 ref.
(N5, N7a, 3-69; Al, *Be*)

146-N.* (Japanese.) **Grain Size of Copper Alloys.** Rihei Kawachi and Mutsumi Okawa. *Sumitomo Metals,* v. 9, July 1957, p. 185-194.

Effect of degree of prior deformation and annealing temperature on grain size of 70-30 brass and Albrac; isothermal grain growth; distribution of grain size along direction of thickness in sheet; grain size and stress-corrosion cracking; grain size and high-temperature tensile properties. 13 ref.
(N3, M27c, 3-68, 2-64; Cu)

147-N.* (English.) **Solid State Diffusion in the Reduction of Hematite.** John Olof Edström. *Jernkontorets Annaler,* v. 141, Dec. 1957, p. 809-836.

Solid state reduction of hematite to magnetite and wustite at 600-1200° C. Single crystal plates pressed between powdered iron and wustite as specimens were annealed. Hematite with iron yielded wustite and magnetite layers, with wustite gave magnetite layers alone. Rate constants and activation energies for reduction of Fe_2O_3 closely agree with gaseous reduction. Calculation of self-diffusion coefficients for iron in wustite and in Fe_3O_4. 78 ref.
(N1, D8; Fe)

148-N.* **Activity of Zinc Oxide in Lead and Copper-Crucible Slags Which Have Been Subjected to Fuming.** A. I. Okunev and V. S. Bovykin. *Academy of Sciences of the USSR, Proceedings, Chemistry Section,* v. 112, Jan-Feb. 1957, p. 13-15. (Translated by Consultants Bureau, Inc.)

In slags with less than 8% Zn, activity of zinc oxide is close to unity (0.95-0.97), and for less than 15% Zn, it decreases to 0.88-0.90.
(P12b; Pb, Cu, *Zn*, RM-q)

149-N.* **Recrystallization Diagram of Iodide (Process) Zirconium.** E. M. Savitsky and V. F. Terekhova. *Academy of Sciences of the USSR, Proceedings, Chemistry Section,* v. 112, Jan-Feb. 1957, p. 49-51. (Translated by Consultants Bureau, Inc.)

Based on the recrystallization diagram, annealing temperatures of 700-750° for cold worked Zr can be recommended. Complete reduction of the deformed structure (recrystallization conditioning) occurs, grain dimensions increase insignificantly, and the Zr articles are oxidized little at these temperatures, even during annealing in air.
(N5, J23; Zr)

150-N.* **Some Observations of the Effects of Oxygen on the Minority Carrier Lifetime and Optical Absorption of Silicon Crystals Pulled in Vacuo.** G. W. Green, C. A. Hogarth and

F. A. Johnson. *Journal of Electronics and Control,* v. 3, Aug. 1957, p. 171-182.

Techniques and equipment for producing single crystals of Si by pulling from a melt in vacuo; some electrical characteristics of crystals so grown. The minority carrier lifetime decreases radially from the center of the crystals and this behavior is believed to arise from a difference in oxygen concentration, being greater near the axes of the crystals and smaller toward the edges. Optical absorption measurements, which indicate the relative concentrations of oxygen in Si crystals grown by various techniques, suggest that while there is a low concentration in vacuum-grown crystals, there is still a radial variation as postulated above.
(N3r, P15; Si, 14-61)

151-N.* Anisotropic Diffusion Lengths in Germanium and Silicon Crystals Containing Parallel Arrays of Edge Dislocations. R. L. Bell and C. A. Hogarth. *Journal of Electronics and Control,* v. 3, Nov. 1957, p. 455-470.

Techniques for introducing parallel arrays of edge dislocations into Ge and Si by means of plastic bending. Crystals of Ge with a similar arrangement of dislocations, but with a higher mean minority carrier lifetime than for those subjected to plastic bending, may be grown by pulling from the melt using a suitably orientated dislocated seed crystal. In crystals containing parallel arrays of edge dislocations the diffusion length is no longer independent of direction but is greater when measured along the dislocations than across them. The model used to explain the results suggests that the anisotropies observed will be more marked for crystals in which the dislocations are high polygonized. 12 ref.
(N3r, M26b; Ge, Si; 14-61)

152-N. Radial Variation of Minority Carrier Lifetime in Vacuum-Grown Germanium Single Crystals. C. A. Hogarth and P. J. Hoyland. *Journal of Electronics and Control,* v. 4, Jan. 1958, p. 60-62.

(N3r, P15, Ge, 14-61)

153-N. Rate of Growth of Diffusion Layers in U-Al and U-AlSi Couples. L. S. DeLuca and H. T. Sumsion. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-1747, May 1, 1957, 34 p.

12 ref. (N1c; U, Al, Si)

154-N.* Age-Hardening Mechanism in Magnesium-Lithium-Zinc Alloys. J. B. Clark and L. Sturkey. *Institute of Metals, Journal,* v. 86, Feb. 1958, p. 272-276.

Precipitation of Li-Zn phase studied by hardness measurements and metallographic and X-ray diffraction methods during aging; behavior of alloy at various temperatures; formation of transition structure and its composition; cause of instability in strength of alloy.
(N7a; Mg, *Li, Zn*)

155-N. Mechanism of Formation of Polygonization Sub-Structures Observed on Alpha-Uranium After Heat Treatment in the Gamma-Phase. A. Robillard and D. Calais. *United Kingdom Atomic Energy Authority,* IGRL-T/C-53, Nov. 1957, p. 3-4. (From *Comptes Rendus,* v. 245, 1957, p. 309-312.)

(N9; U)

156-N. (French.) Discontinuous Recrystallization of Aluminum-Copper Alloys. Christiane Renon and Jean Calvet. *Comptes Rendus,* v. 246, Jan. 13, 1958, p. 269-272.

(N5f; Al, *Cu*)

157-N.* (French.) Study of the Aging of Pure Iron by Measurement of Its Electrical Resistance at Very Low Temperatures. Bernard Migaud and Michel Wintenberger. *Comptes Rendus,* v. 246, Jan. 20, 1958, p. 425-428.

Study revealed nature of precipitation of atoms of dissolved carbon and showed that annealing at temperatures below 200° C. causes these precipitates to evolve and rapidly lose their influence on mechanical properties and electrical resistance.
(N7, 2-63, P15g; Fe-a)

158-N. (French.) Intergranular Accumulation of Sulphur in Pure Iron Charged in Cathodic Hydrogen in the Presence of Sodium Sulphide. Simone Besnard and Jean Talbot. *Comptes Rendus,* v. 246, Jan. 27, 1958, p. 607-608.

(N1h; Fe-a, *S*)

159-N.* (French.) Contribution to the Study of TTT Curves in Steels. L. Harbraken. *Proceedings of the Third International Conference on Electron Microscopy, London, 1954,* Royal Microscopical Society, 1956, p. 202-206.

Electron metallography revealed various structures in low-alloy steels not revealed by optical metallography. Use of related methods (X-ray study, electron diffraction), as well as study of precipitates ex-

tracted by electrolysis, made possible confirmation of existence of these structures and definition of their nature. Suggested interpretations are advanced.
(N8, M21e; AY)

160-N.* (French.) **Movies of the Recrystallization of Metals Observed by Emission Microscope.** M. Gauzit. *Proceedings of the Third International Conference on Electron Microscopy, London, 1954,* Royal Microscopical Society, 1956, p. 210.

Commentary on presentation of film showing recrystallization phenomena in molybdenum. (N5, M21e)

161-N.* (French.) **Application of Electron Microscopy to Study of Solid State Transformations in Some Metals and Alloys.** A. Saulnier. *Proceedings of the Third International Conference on Electron Microscopy, London, 1954,* Royal Microscopical Society, 1956, p. 213-217.

Structural transformations produced by hardening and tempering in Al-Cu, Al-Mn and Cu-Be alloys, and in Ti and its alloys. Electron micrographs, obtained by oxide and celluloid-silica replica methods.
(N-general, M21e; Al, Ti)

162-N. (German.) **Diffusion of Oxygen in Tantalum.** E. Gebhardt, H. D. Segezzi and A. Stegherr. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 624-627.

(N1c; Ta, *O*)

163-N.* (Russian.) **Processes of Recrystallization of Nickel Alloys.** M. E. Blanter and L. I. Kuznetsov. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 31-36.

Investigation of Ni alloys for gas turbines. Bimetallic alloys of varying composition were prepared, heat treated at 885° C., and compressed at room temperature. Grain size was determined by method of accidental secants. In Ni-Mo alloys, beginning of softening was marked by a reverse trend in temperature of recrystallization which abruptly rises when Mo reaches 8%. There is a relationship between softening and cold working. Various content of Co, Cr, Ti or Mo changes the character of softening.
(N5, 2-60; Ni)

164-N.* (Russian.) **Distribution of Chromium Between Phases of White Cast Iron.** I. E. Lev. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 49-52.

Analysis of ferrite and cementite in white cast iron shows that Cr is largely concentrated in the carbide form. Distribution of Cr is not permanent but depends on such factors as high temperature and thickness of the poured metal. Cr content in the carbide phase is influenced by the rapidity of cooling. The greater the carbide phase the greater the quantity of ferrite with Cr. Isothermal heating results in greater Cr concentration in the carbide phase. 10 ref. (N8r; CI-p, *Cr*)

165-N.* **Isothermal Transformation of Spheroidized Pearlite to Austenite.** A. A. Golestaneh, C. Handford and G. Bullock. *Iron and Steel Institute, Journal,* v. 188, Mar. 1958, p. 237-241.

Investigation on isothermal transformation of plain carbon steel by electrical resistance technique. Influence of cementite distribution and transformation temperature. Spheroidized pearlite begins transforming earlier than lamellar pearlite. Above 740° C. transformation of lamellar pearlite is completed more quickly. Transformation-time diagrams given.
(N8g; ST)

166-N.* **Study of the Ferritization of Nodular Iron.** Earl J. Eckel. *Modern Castings,* v. 33, Apr. 1958, p. 85-99.

Nodular irons of two compositions were subjected to four types of ferritizing heat treatment; slow cooling through eutectoid range; quenching to and holding at temperatures both below and above the critical temperature for isothermal transformation; reheating of pearlitic structures to various temperatures and tempering of martensitic structures. Results of this response, tensile and impact properties of the treated specimens, quantitative metallography. 11 ref. (N8; CI-r)

167-N.* (English.) **Contribution to the Estimation of M_s from the Composition of Steels.** J. A. Verö. *Acta Technica Academiae Scientiarum Hungariae,* v. 19, Aug. 1957, p. 193-197.

Since starting temperatures of martensite formation vary in a nonlinear fashion, depending on carbon content, previously proposed linear equations give inaccurate results. A parabolic equation is presented which corresponds closely with experimental data. (N8p, ST)

168-N.* (Czech.) **Graphitization of Pearlitic Cementite in Spheroidal Graphite Cast Iron at Hypoeutectoid**

Temperatures. Stanislav Drapal. *Hutnické Listy,* v. 13, Jan. 1958, p. 42-49.

Decomposition of the cementite reveals that spheriodization and coagulation occur first. Graphitization is not pronounced until after a time which increases with increasing Cr content, decreasing temperature and diminishing Si content. During graphitization, Cr in the residual complex cementite increases. The cementite undecomposed increases with increasing Si content. Cr in the cementite is higher in cast iron containing more Si. 20 ref. (N8s; CI-r)

169-N. (Czech.) **Carbide Grain Growth in the Production of Carbide-Containing Hard Alloys by Means of Powder Metallurgy. Pt. 1.** Bohuslav Cech. *Hutnické Listy,* v. 13, Feb. 1958, p. 113-118.

Dependence of grain growth on temperature and sintering time. 17 ref. (N3m, H-general; 6-69)

170-N. (Czech.) **Carbide Grain Growth in the Production of Carbide-Containing Hard Alloys by Means of Powder Metallurgy. Pt. 2.** Bohuslav Cech. *Hutnické Listy,* v. 13, Feb. 1958, p. 118-122.

Influence of alloying carbides on grain growth process. 13 ref. (N3m, 2-60, H-general; 6-69)

171-N. (Czech.) **Bainite Reaction.** Josef Cadek and Dagmar Tlusta. *Hutnické Listy,* v. 13, Feb. 1958, p. 123-133.

Kinetics and characteristics of the reaction. 44 ref. (N8m)

172-N.* (French.) **Some Decomposition Structures in Austenitic Manganese Steels.** Rene Castro and Pierre Garnier. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 17-23.

Study of transformation structures in 12-15% Mn Hadfield steel during isothermal heat treatment to establish a relation between thermal history of parts out of service and their micrographic structure a posteriori. Particular attention paid to structures of the upper area of the transformation range. 7 ref. (N8g; AY, *Mn*)

173-N.* (French.) **Method of Determining the Coefficient of Diffusion of Hydrogen in Steel. Influence of Micrographic Structure on This Diffusion.** Paul Bastien and Pierre Amiot. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 24-38.

Review of classic theories of diffusion and presentation of new theoretical method for more accurate determination of diffusion coefficients. Method applied to carbon and low-alloy ferritic steels. Results showed that structures which are most stable thermodynamically, with finely divided carbides (globular pearlite), have higher diffusion coefficients than those of other structures possible in ferritic steels. 36 ref. (N1a; ST, *H*)

174-N.* (French.) **Structural Changes in a 10% Nickel Stainless Steel Deformed at Temperatures Between −200° and 800° C.** Bernard Jaoul. *Revue du Nickel,* v. 23, Oct-Dec. 1957, p. 91-97.

Formation of martensite by decomposition of austenite during deformation at lower-than-ambient temperatures depends on stress applied. Bainitic transformation, in which diffusion is also involved, is product of speed and temperature at which deformation occurs. In steel studied, bainitic structure appears as a result of slow deformation under tensile stresses of over 45 kg. per sq. mm., at temperatures between ambient and 600° C. 6 ref. (N8m, 3-68, SS, *Ni*)

175-N.* (Hungarian.) **Diffusion of Carbon in Gamma Iron Containing Titanium.** Janos Prohaszka. *Kohaszati Lapok,* v. 12, July 1957, p. 269-275.

Increase of Ti content slows down carbon diffusion. Diffusion factor changes because the separation of Ti causes change in atomic structure. 21 ref. (N1, 2-60; Fe, *Ti*)

176-N.* (Japanese.) **Solidification of Magnesium Treated Cast Iron.** Goro Ohira and Katsuya Ikawa. *Casting Institute of Japan, Journal,* v. 29, Nov. 1957, p. 772-781.

Nodular graphite may be formed by separation as primary graphite in hypereutectic at pro-eutectic temperature; separation on dendrites of primary austenite in hypereutectic below eutectic temperature; separation from spheroidal austenite in slightly hypo-eutectic and separation from super-cooled primary austenite dendrite in hypo-eutectic with low degree of carbon saturation at end of solidification process. 11 ref. (N12, E25q; CI-r)

177-N. Change in Structure of Cemented Carbides on Heating. P. K. Mikhailova. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p.

45-48. (Henry Brutcher, Altadena, Calif., Translation no. 4045.)

Previously abstracted from original. See item 71-N, 1957.
(N3, 2-62, 6-69; W, Co)

178-N. (English.) **Study of the Eutectoid Transformation of Cu-Al Alloys by Measuring Young's Moduli.** Toshimasa Morooka. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 55-56.

(N9; Cu, Al)

179-N.* (English.) **Study on Bimetal Casting, Especially on the Adhesion Phenomenon Between Copper and Brass.** Tsunemitsu Muraki. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 73-75.

Adhesion phenomenon investigated by contacting small pieces of brass having various Zn concentrations with pure Cu at high temperatures in an atmosphere of inert gas. Adhesion appears to be controlled by intermetallic diffusion of constitutional elements of both metals.
(N1h, L22; Cu-a, Cu-n)

180-N.* (Czech.) **Influence of Silicon and Chromium on Eutectoid Transformation of Austenite During Continuous Cooling of Spheroidal Cast Iron.** Stanislav Drapal. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1087-1094.

Relationship between Si and Cr content and cooling velocity on the transformation of austenite. Increasing the cooling rate suppresses formation of ferrite; Si shortens incubation period and supports formation of ferrite; Cr prolongs incubation period and suppresses formation of ferrite.
(N8, 2-60; CI-r, *Si, Cr*)

181-N.* (Polish.) **Influence of Hot Plastic Working Upon Isothermal Transformation of Austenite in Chromium-Nickel-Molybdenum Structural Steel.** Tadevsz Maliewicz. *Hutnik,* v. 24, Nov. 1957, p. 427-436.

TTT-curves for steel containing 0.36% C, 1.43% Cr, 1.46% Ni and 0.23% Mo at 850, 950 and 1050° C. Raising the temperature of transformation decreases transformation rate in pearlitic region. Influence of plastic deformation explained as function of three factors: formation of coarse grain, compression and slow austenitic transformation. 14 ref. (N8g, 3-68; AY, *Cr, Ni, Mo*)

182-N.* (Polish.) **Steel Transformation on Rapid Heating.** Stanislaw Gorczyca and Tadeusz Boniszewski. *Hutnik,* v. 24, Nov. 1957, p. 436-448.

Texture of austenitic grains formed on slow and rapid heating. Recrystallization of austenite. Investigation of the crystalline structures of overhead steel obtained upon rapid heating. Attempt to explain austenite recrystallization as a result of the end of dissolution of carbides with simultaneous displacement of small-angle borders. 29 ref. (N8; ST)

183-N.* (Polish.) **Crystallography of Martensitic Transformation.** Jan Karp. *Hutnik,* v. 24, Nov. 1957, p. 448-452.

Survey of several scientists' opinions upon crystallographic relationship and mechanism of the martensitic transformation. 12 ref. (N8p; ST)

184-N. (Russian.) **Structural Abnormalities of Gray Iron.** A. A. Zhukov. *Liteinoe Proizvodstvo,* Dec. 1957, p. 16-20.

Theoretical basis for reverse liquation of Si in Fe, and proof that counter formation of cementite is one of its manifestations. (4 ref. (N8; CI, *Si*)

185-N. (Russian.) **New Method of Investigating Iron.** I. G. Girshovich and L. S. Drugach. *Liteinoe Proizvodstvo,* Dec. 1957, p. 22-23.

Method of determining coefficient of ionic diffusion by studying speed of anodic oxidation has attracted wide interest, although results are not yet conclusive. (N1c, L19; Fe)

186-N. (English.) **On the Natural Aging of Quench-Tempered Steel Wire.** Masayoshi Tagaya and Yoshiro Soyama. *Osaka University, Technology Reports,* v. 6, Oct. 1956, p. 309-312.

(N7a; ST, 4-61)

187-N.* (German.) **Magnetic Aging of Mild Steel.** Werner Matz and Walter Peter. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 655-662.

Different rimming openhearth steels were investigated as to the influence of various components such as C, P, Mn, S, Cr, N, O upon magnetic aging. Increase of coercive force after annealing at 100° C. for 600 hr. N, O and to minor degree S increase and Mn and Cr decrease the magnetic aging. P and C have no effect. 19 ref. (N7, P16; CN, 2-60)

188-N.* (German.) **Age Hardening Copper-Titanium-Aluminum Alloy.** W. Gruhl and H. Cordier. *Metall,* v. 11, Nov. 1957, p. 928-933.

Cu-Ti alloys show very good age hardening properties, increasing the stress-strain values considerably. However, due to the affinity of Ti to oxygen, these alloys never gained wide acceptance. An addition of Al making the alloy a ternary system, prevents oxidation to a large degree. Ductility of the alloy proved satisfactory. 11 ref.
(N7a, Q-general; Cu, *Ti, Al,* 2-60)

189-N.* (German.) **Observations on the Strength Characteristics of Copper-Titanium and Copper-Zirconium Alloys.** K. Dies. *Metall,* v. 11, Nov. 1957, p. 933-941.

Cu-Ti alloys (0.26 to 4.86% Ti) and Cu-Zr alloys (0.23 to .83% Zr) were tested in order to arrive at strength characteristics necessary for their practical utilization. Solubility of Ti in Cu at 400° C. was 0.4% and at 885° C. 4.3% Ti. Age hardening characteristics are determined in relation to time, temperature and deformation. 5 ref.
(N7a, Q27a, 2-60; Cu, *Ti, Zr*)

190-N. (German.) **Influence of Silicides (of Ti, Zr, Mo, W) on the Recrystallization of Pure Aluminum.** H. Hauschka and H. Nowotny. *Metall,* v. 12, Jan. 1958, p. 6-12.

18 ref. (N5; Al-a, AD-p)

191-N. (German.) **Improvement of Al-Al_3Fe Eutectic.** H. Spengler. *Metall,* v. 12, Mar. 1958, p. 201-204.

Some properties of the alloy, especially its resistance to corrosion, can be improved by transforming coarse-grained structure into fine-grained. Experiments performed with rapid cooling, superheating and addition of various metals. Positive results obtained only by rapid cooling. 12 ref.
(N5, R-general, Q-general; Al-b)

192-N. (Russian.) **Investigation of Effect of Tension and Deformation on Self-Diffusion of Iron.** T. I. Gudkova, V. S. Gorbatov, S. Z. Bokshtein, A. A. Zhukhovitskii and S. T. Kishkin. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1438-1439.

9 ref. (N1d, Q24, Q27a; Fe)

193-N.* **Dendritic Segregation of Manganese in Steel Ingots.** R. G. Ward. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 337-342.

The degree of dendritic segregation of Mn in subcritically annealed Ni-Cr steel ingots determined by autoradiography. Manganese is concentrated between the dendrites, and maximum and minimum concentrations of 0.49% and 0.33% have been found in a nominally 0.40% Mn steel. High Mn contents are generally accompanied by high hardness, and maximum and minimum microhardness values of 243 and 161 D.P.N. have been found.
(N12b; AY, *Mn,* 9-69)

194-N.* **Effect of Tantalum and Niobium on the Tempering of Certain Vanadium and Molybdenum Steels.** Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 343-350.

Study of the carbides formed during the tempering of several simple V and Mo steels, in which the onset of secondary hardening can be directly related to the precipitation of V_4C_3 and Mo_2C by use of electron microscopic and electron diffraction methods. Small additions (0.05 to 0.25%) of Ta and Cb have considerable influence on the secondary hardening characteristics of these steels. 11 ref. (N7, N8a, 2-60; AY, *Ta, Cb, V, Mo*)

195-N. Strain Aging Hydrogen Embrittlement in Alpha-Beta Titanium Alloys. Harris M. Burte. *Society of Rheology, Transactions,* v. 1, 1957, p. 119-151.

Hydrogen contamination in the alpha-beta class of Ti alloys leads to a very pronounced strain rate sensitivity of the ductility of these materials, and to low stress, premature fracture under sustained tensile loading (creep). Effects of strain rate, hydrogen concentration, temperature, stress concentrations, alloy composition, and microstructure. 15 ref. (N7e, Q26s; Ti-b)

196-N. Effect of Plastic Deformation on the Speed of Diffusion. A. A. Presniakov. *Soviet Physics, Technical Physics,* v. 2, no. 3, 1957, p. 512-513. (Translation by American Institute of Physics.)

Experiments to estimate influence of the state of the metal lattice on the mobility of atoms of various elements through it. 7 ref. (N1a, Q24)

197-N. Looking Inside Stainless Ingots. J. C. Fulton and R. H. Henke. *Steel,* v. 142, Feb. 17, 1958, p. 132-134.

Study of solidification by examining the as-cast structure of some

ferritic and austenitic stainless alloys. (N12, M27c; SS, 5-59)

198-N.* (French.) **Formation of Temper Carbon in Steels and White Cast Irons.** Jacques Pomey, Robert Lafont and Louis Abel. *Comptes Rendus,* v. 246, Feb. 17, 1958, p. 1044-1046.

In extra hard steels which have been tempered and quenched, then graphitized, each martensite platelet is capable of producing a monocrystalline graphite platelet, which confirms the phenomena of cohesion and epitaxy. Hence, activation energy of growth of graphite appears to be energy of self-diffusion of iron, both in alpha state and gamma state. (N8s, P13a; ST, CI-p)

199-N.* (French.) **Effect of Rapid Cooling on Growth of Aluminum Monocrystals.** H. Latiere. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 145-165.

Report of preliminary experiments indicating differences in results of continuous annealing and successive anneals. Via macroexamination and a method of X-ray study which permits examination of entire specimen, effects on grain growth resulting from annealing after quenching of quenching temperature and speed, time elapsing between quenching and anneal, quenching distortions. It is thought that vacancies solidified by quenching congregate in cavities, forming a "string of beads" in front of dislocations, which are consequently obstructed. (N3, 2-64; Al)

200-N. (Russian.) **Reducing Nonmetallic Inclusions in Molten Steel.** D. S. Gerchikov. *Metallurg,* Jan. 1958, p. 15-17.

Use of radioactive isotopes to investigate causes for inclusions. (N12, D9, 1-59, 9-69; ST)

201-N. (Russian.) **Investigation of Mechanism of Transformation of Pearlite Into Austenite.** G. T. Fomin. *Zavodskaya Laboratoriya,* Jan. 1958, p. 56-57.

(N8h)

202-N. (Russian.) **Microstructural Investigation of Phase Changes in Metalloceramic Systems During Heating.** Ya. G. Davidovich and K. V. Kononova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 62-63.

(N6, 2-62; 6-70)

203-N. (Russian.) **Criteria for Determination of Depth of Cementite Layers.** E. G. Perel'man. *Zavodskaya Laboratoriya,* Jan. 1958, p. 65-67.

(N8, ST)

204-N.* **Growth Conditions for Equiaxed Crystals in Aluminum-Magnesium Alloys.** T. S. Plaskett and W. C. Winegard. *American Society for Metals, Transactions,* Preprint no. 77, v. 51, 1957, 15 p.

Breakdown from columnar growth to equiaxed growth for Al-Mg alloys was found to be dependent upon the rate of solidification, the temperature gradient in the liquid ahead of the solid-liquid interface, and the solute concentration. It is suggested that constitutional supercooling ahead of the dendritic interface promotes nucleation in the melt. 7 ref. (N12; Al, *Mg*)

205-N.* **The Solubility of Hydrogen in Magnesium.** J. Koeneman and A. G. Metcalfe. *American Society for Metals, Transactions,* Preprint no. 78, v. 51, 1957, 15 p.

Solubility between 550 and 775° C. determined using a modified Sieverts apparatus. The Mg is contained in a thin-walled envelope of iron to prevent evaporation and consequent attack on the silica tube. Small pressure differences develop across the iron envelope; these have been measured and used to correct the solubility readings to 1 atm. pressure. Corrected solubilities in cc. of hydrogen per 100 g. of Mg are 31 at 640° C.; 46.5 at 675° C.; 60 at 725° C.; and 63 at 775° C. 7 ref. (N15d; Mg, *H*)

206-N.* **Aging Characteristics of Hastelloy B.** R. E. Clausing, P. Patriarca and W. D. Manly. *American Society for Metals, Transactions,* Preprint No. 79, v. 51, 1957, 9 p.

Aging characteristics were studied in the range from 1100 through 1650° F. for periods ranging from 100 to 1000 hr. Microstructures and hardness data. Short-time tensile data obtained at room temperature and at the temperature of aging are correlated to the microstructure. Precipitation occurs at all of the temperatures investigated. (N7b; Ni-b, SGA-h)

207-N. **Influence of Alloying Elements on Hydrogen Content and Hydrogen Mobility in Steel.** Yu. A. Klyachko and T. S. Izmanova. *Stal',* v. 17, no. 6, 1957, p. 507-511. (Henry Brutcher, Altadena, Calif., Translation no. 4047.)

Effect of Ti, Si, C, Mn and Zr on hydrogen content of as-cast and as-forged steel specimens and on rate of hydrogen effusion (mobility). (N1, 2-60, H, ST, *C, Mn, Si, Ti*)

208-N. **Device for Direct Growing of Crystals From High-Reactivity Metal Powders.** D. A. Petrov and Yu. M. Shashkov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, May 1957, p. 102-103. (Henry Brutcher, Altadena, Calif., Translation no. 4074.)

Device for the fusion of highly reactive metals in powder form without the use of a crucible, and with avoidance of any interaction between metal and gaseous phase as well as any contamination of the metal by the material of the heating unit. Single crystals of Si produced. (N3r; Si, 6-68)

209-N. (Czech.) **Structural Stability of 12% Chromium-Tungsten-Molybdenum-Vanadium Steels.** J. Koutsky, J. Neid and J. Jezek. *Hutnické Listy,* v. 13, Mar. 1958, p. 119-206.

Delta ferrite appears besides sorbite in the structure in the refined state with a higher content of tungsten. 21 ref.
(N8, N7; ST, *Cr, W, Mo, V*)

210-N.* (Czech.) **Carbide Reactions in Molybdenum Steels.** Josef Cadek, Bernard Fleischer and Karel Mazanec. *Hutnické Listy,* v. 13, Mar. 1958, p. 206-212.

Reactions at 650° C. during tempering of martensite, isothermal decomposition of austenite and long-term heating of decomposition products. Mo_2C often forms in the austenite decomposition as part of a special eutectoid; Mo_3C forms in the martensite decomposition of steel with 0.38% C and 3.8% Mo.
(N8; AY, *Mo*)

211-N.* (Czech.) **Phase Analysis of Joints Obtained in Resistance Welding of Unalloyed and Low-Alloy Carbon Steels.** Ivan Hrivnak. *Hutnické Listy,* v. 13, Mar. 1958, p. 233-241.

All phases have a lamellar structure. Cementite lamellae in the pearlite are spaced from 10 to 1 micron; distances of carbide lamellae in the troostite and sorbite are from minimum to 0.1 micron. Chromium carbides in carbon-rich, low-alloy chromium steel have grained substructure. Decarburization and spontaneous diffusion of carbon into austenite with final diffusion on gamma-grain boundaries was found. 24 ref. (N8, K3; CN, AY)

212-N.* (German.) **Influence of Extrusion Effect on Strain Hardening of a Heat Treatable Aluminum-Copper-Magnesium Alloy.** H. Richter and G. Wassermann. *Aluminium,* v. 34, Apr. 1958, p. 193-199.

Extrusion effect is an irregularity of mechanical properties with abnormally high strength and yield point and reduced elongation in the extrusion direction, and low values transverse to the extrusion direction; the effect is textural. Brittleness of extruded specimens, which prevents necking, persists during natural aging, but disappears during artificial aging. Extrusion effect also occurs when there is recrystallization in homogenization, provided extrusion texture is preserved. 16 ref. (N7e, Q24g; Al-b, Cu, Mg)

213-N. (German.) **Iron-Nickel-Cobalt Alloys for Glass-Metal Welding.** Horst Hermann and Hans Thomas. *Zeitscrift für Metallkunde,* v. 48, Nov. 1957, p. 582-587.

Tracing of alpha-gamma phase transformation in five alloys by polarization optical method and by measurement of the electrical resistance.
(N6p, M21g, K11a; Fe, Ni, Co)

214-N.* (Russian.) **Composition and Structure of Decarburizing and Transition Zones in Tempered Cast Iron.** K. I. Vashchenko and N. A. Golovan. *Liteinoe Proizvodstvo,* Mar. 1958, p. 16-20.

Observations on cast iron which was annealed at various temperatures in air. Diffusion of P, Mg, Cr and Mn into transition zone which has pearlitic structure and decreases plasticity of metal. Carbides in transition zone have a higher heat resistance than the free cementite. (N8, N1, 2-64; CI)

215-N.* **Solid Solution Hardening.** W. R. Hibbard, Jr. *AIME Transactions,* v. 212, Feb. 1958, p. 1-5.

Evidence confirms previous findings that models of solution strengthening depending solely on lattice parameter changes are incomplete. Direct evidence for the Suzuki interaction of chemical effects was obtained from alloys with constant lattice parameter, for which solution strengthening was nearly independent of temperature from 300 to 20° K. 7 ref.
(N7a, N12p)

216-N.* **Micrographic Investigation of Precipitation in Pb-Sn Alloys.** D. Turnbull and H. N. Treaftis. *AIME*

Transactions, v. 212, Feb. 1958, p. 33-39.

Precipitation of Sn from Pb-Sn alloys (lead-rich) occurs by the nucleation and growth of hemispherical cells which consist of Sn lamellae interspersed in the depleted solid solution. Nucleation and growth of these cells and the Sn interlamellar spacing at various compositions and temperatures. Interlamellar spacing increases approximately as the reciprocal of the logarithm of the supersaturation ratio. 12 ref. (N7b; Pb, *Sn*)

217-N.* Solid Solubility of Uranium in Thorium and the Allotropic Transformation of Th-U Alloys. Wendell B. Wilson, Alfred E. Austin and Charles M. Schwartz. *AIME Transactions,* v. 212, Feb. 1958, p. 52-55.

High-temperature X-ray diffraction studies were conducted with Th-U alloys with up to 10% U. Solid solubility of U in Th as a function of temperature was determined by the method of lattice parameters. Thorium will dissolve up to 2.5% U at 950° C., 4.5% U at 1150 and 7.5% U at 1250° C. Determinations were made of the temperature of the transition of Th and of the effect of U upon the transition. 12 ref. (N12p, N6p; Th, U)

218-N.* Comparison of the Structure of the Omega Transition Phase in Three Titanium Alloys. S. A. Spachner. *AIME Transactions,* v. 212, Feb. 1958, p. 57-59.

Analysis of the powder patterns of the omega transition phase in three binary Ti alloys containing 8% Cr, 13% Mo, and 15% V, respectively, showed that all could be indexed on an orthorhombic unit cell. Unit-cell dimensions were all quite similar. There is evidence for the occurrence of more than one transition phase in Ti-Cr and Ti-V alloys. 4 ref. (N11h, M26; Ti-b)

219-N.* Information on "Nuclei" for Secondary Recrystallization in Si-Fe. C. G. Dunn and P. K. Koh. *AIME Transactions,* v. 212, Feb. 1958, p. 80-84.

Microstructure, magnetic torque and texture data before and after grain growth were obtained on two 3.25% Si-Fe specimens having initially the same cold rolled textures and the same primary recrystallization textures. The textures of the two specimens obtained by grain growth were different. Texture changes observed are considered to favor the oriented-nucleation growth-selectivity theory more than the oriented-growth theory. 17 ref. (N5h, M26c; Fe, *Si*)

220-N. Steady-State Diffusion in Substitutional Solid Solutions. A. S. Yue and A. G. Guy. *AIME Transactions,* v. 212, Feb. 1958, p. 107-112.

Effects of a prolonged flux of Zn atoms through the alpha solid solution of Zn in Cu. 17 ref. (N1c; *Zn,* Cu)

221-N.* Rate of the Carbon-Oxygen Reaction in Liquid Iron. N. A. Parlee, S. R. Seagle and R. Schuhmann, Jr. *AIME Transactions,* v. 212, Feb. 1958, p. 132-137.

Rates of CO evolution and CO absorption were measured for liquid iron alloys containing from 0.15 to 4.4% C, using a modified Sieverts apparatus. Data are interpreted on the hypothesis that the C-O reaction rate is controlled by oxygen diffusion across the boundary layer at the gas-metal and crucible metal surfaces. 7 ref. (N16M, P12; Fe)

222-N. Nucleation of Solid-State Transformations. Morris Cohen. *AIME Transactions,* v. 212, Apr. 1958, p. 171-183.

The 1957 Institute of Metals Division Lecture. 46 ref. (N2, N3)

223-N.* Hydrogen Solubility and Removal for Titanium and Titanium Alloys. W. M. Albrecht and M. W. Mallett. *AIME Transactions,* v. 212, Apr. 1958, p. 204-210.

Solubilities of hydrogen in Ti and several of its alloys were determined at 600 to 1000° C. and pressure of 0.05 to 10 microns of mercury. Solubility increases with increasing beta phase. Factors found to affect degassing rates are specimen size and presence of thick surficial oxide. Removal of hydrogen by heating in vacuum and in flowing inert atmospheres was studied. 10 ref. (N15d; Ti, *H*)

224-N. Effects of the Proeutectoid Ferrite Reaction on the Formation of Pearlite. H. I. Aaronson. *AIME Transactions,* v. 212, Apr. 1958, p. 212-218.

Effects discussed in terms of the influence of transformation strain energies and of the interfacial free energy of austenite-ferrite boundaries on the rate of pearlite nucleation. 13 ref. (N8h, N8j)

225-N.* Further Evidence of Zoning in a Nickel-Chromium-Titanium-

Aluminum Alloy. N. E. Rogen and N. J. Grant. *AIME Transactions,* v. 212, Apr. 1958, p. 218-219.

Investigation to establish whether atomic re-arrangements (zoning) occur in the supersaturated solid solution prior to the actual precipitation of the gamma-phase. 7 ref. (N7, M25; Ni, Cr, Ti, Al)

226-N.* Environmental Effects on Hydrogen Permeation Through Steel During Abrasion. D. E. Swets, R. C. R. Frank and D. L. Fry. *AIME Transactions,* v. 212, Apr. 1958, p. 219-220.

Recent experiments have shown that another group of operations, namely, sanding and grinding, must be added to the already well-established list of phenomena that cause hydrogen to permeate steel. (N1, G18, L10a; ST, *H*)

227-N. Effect of Deformation and Low Temperatures on the Structures of AgCd and AuZn. D. M. Masson and C. S. Barrett. *AIME Transactions,* v. 212, Apr. 1958, p. 260-265.

Martensitic transformations have been found in AgCd both upon cold working at room temperature and cooling to lower temperatures. Crystal structures of the transformation products were found to be close-packed hexagonal in the first case and orthorhombic in the latter. Transformation characteristics also were studied. 22 ref. (N6q, M26, 3-68; Ag, Cd, Au, Zn, 14-68)

228-N.* Phase Transformations in Titanium-Rich Alloys of Titanium and Cobalt. F. R. Swann and J. G. Parr. *AIME Transactions,* v. 212, Apr. 1958, p. 276-279.

Quenched structures were studied in alloys containing up to 12.5% Co. Subsequent decomposition of a 10% Co retained-beta phase alloy was investigated using metallographic and X-ray diffraction methods. Hardness measurements also were made during the decomposition process. Precipitation of Ti_2Co is by nucleation and growth. 9 ref. (N6, N7; Ti, *Co*)

229-N. Electron Micrographic Study of Aging in a Beta Titanium Alloy. F. C. Holden and A. P. Young. *AIME Transactions,* v. 212, Apr. 1958, p. 287-288.

6 ref. (N7b, Ti)

230-N.* Precipitation of Nickel and Copper From Supersaturated Solutions in Germanium. P. Penning. *Philips Research Reports,* v. 13, Feb. 1958, p. 17-36.

Both Cu and Ni atoms can be located at lattice sites (substitutional atoms) or at interlattice sites (interstitial atoms). An exchange between the two types of atom is possible by the reaction: substitutional atom $\rightleftarrows$ interstitial atom + vacancy. The vacancy is an acceptor with only one level in the lower half of the forbidden band, located at 0.02 eV from the valence band. 18 ref. (N7b, M26s; Ni, Cu, Ge)

231-N. Precipitation of Lithium in Germanium. F. J. Morin and Howard Reiss. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 196-209.

Studied by resistivity methods. The kinetics of precipitation follow an exponential law with constants predicted by theory. This indicates that the precipitate particles are approximately spherical. Evidence is found that nucleation centers are vacant Ge lattice sites. 42 ref. (N7b; Ge, Li)

232-N. Mechanism and Kinetics of Age Hardening in Mg-Li Alloy Systems. J. B. Clark. Dow Chemical Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131567, Oct. 1957, p. $1.50.

Determination of the habit plane of the Widmanstatten precipitate of the LiZn phase in the cubic Li-Mg solid solution; precipitation of the MgLiZn phase in the cubic Li-Mg solid solution during aging; degree of stabilization attainable through disregistry adjustment by additions of indium to Mg-Li-Al and Mg-Li-Zn alloys. (N7a; Mg, *Li, Al, Zn, In*)

233-N. Behavior of Hydrogen in Iron (Steel). A. Smialowski. *Neue Hütte,* v. 2, no. 10, 1957, p. 621-626. (Henry Brutcher, Altadena, Calif., Translation no. 4082.)

Previously abstracted from original. See item 130-N, 1958. (N1c; Fe, *H*)

234-N. Recrystallization Diagram for Molybdenum. E. M. Savitskii. *Doklady Akademii Nauk SSSR,* v. 113, no. 5, 1957, p. 1070-1072. (Henry Brutcher, Altadena, Calif., Translation no. 4086.)

(N5; Mo)

235-N. Inhibition of Diffusion of Hydrogen Into Iron and Steel by Sur-

face Deposits of Certain Metals in Electrolytic Pickling. L. I. Freiman and V. A. Titov. *Zhurnal Fizicheskoi Khimii*, v. 30, no. 4, 1956, p. 882-888. (Henry Brutcher, Altadena, Calif., Translation no. 4089.)

Effect of electrolytic deposits of Pb, Sn, Cu and Ni in various thicknesses on diffusion of hydrogen, catalyzed by a poison, through (Armco) iron and (spring) steel during electrolytic pickling. (N1, 8-62; *H*, Fe, ST, *Cu, Pb, Sn*)

236-N. Crystal Structure and Nature of Omega Phase in Alloys of Titanium With Chromium. Yu. A. Bagaryatskii. *Doklady Akademii Nauk SSSR*, v. 105, no. 6, 1955, p. 1225-1228. (Henry Brutcher, Altadena, Calif., Translation no. 4103.)

Previously abstracted from original. See item 96-N, 1956. (N9, M26, Ti, *Cr*)

237-N. Effect of Ultrasonic Vibration on the Structures of Eutectic Alloys. V. V. Zaboleev-Zotov and G. I. Pogodin-Alekseev. *Metallovedenie i Obrabotka Metallov*, no. 1, Jan. 1958, p. 2-6. (Henry Brutcher, Altadena, Calif., Translation no. 4106.)

(N12q, 1-74; Pb, Sb, Zn, Sn)

238-N. Effect of Boron on the Kinetics of Austenite Grain Growth and the Actual Austenite Grain Size. A. M. Tarasov. *Metallovedenie i Obrabotka Metallov*, no. 1, Jan. 1958, p. 17-20. (Henry Brutcher, Altadena, Calif., Translation no. 4118.)

(N3, M27c, 2-60; *B*, ST)

239-N. Solubility and Activity of Oxygen in Liquid Iron, Nickel, Cobalt and Their Mixtures. V. V. Averin, A. Yu. Polyakov and A. M. Samarin. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 8, 1957, p. 120-122. (Henry Brutcher, Altadena, Calif., Translation no. 4128.)

Study of activity of oxygen in Fe-Ni-Co system, aimed in part at obtaining data on solubility and activity of oxygen in the pure components of this system. (N16m, P12b, P12e; *O*, Fe, Ni, Co, 14-60)

240-N. Carbides Formed in the Low-Temperature Decomposition of Austenite. V. G. Permyakov. *Metallovedenie i Obrabotka Metallov*, no. 3, Mar. 1958, p. 24-29. (Henry Brutcher, Altadena, Calif., Translation no. 4163.)

(N8r, 2-63; AY, CN)

241-N. Diffusion of Antimony and Zinc From the Vapor Phase Into Germanium. V. E. Kosenko. *Academy of Sciences of the USSR, Bulletin*, v. 20, no. 12b, 1957, p. 1399-1404. (Columbia Technical Translations.)

4 ref. (N1c; Ge, Sb, Zn)

242-N.* (English.) **Studies on the Beta-Epsilon Transformation in Cobalt-Nickel Alloys. Pt. 1. Propagation Process of the Transformation.** Sakae Takeuchi and Toshio Honma. *Tohoku University, Science Reports of the Research Institutes*, Series A, v. 9, Dec. 1957, p. 492-507.

Metallographic investigation of the propagation of diffusionless transformation of the face-centered cubic structure (beta) into the close-packed hexagonal (epsilon) in Co alloys containing up to 30% Ni. 8 ref. (N6p; Co, *Ni*)

243-N.* (English.) **Studies on the Beta-Epsilon Transformation in Cobalt-Nickel Alloys. Pt. 2. Microstructure of Transformation Relief.** Sakae Takeuchi and Toshio Honma. *Tohoku University, Science Reports of the Research Institutes*, Series A, v. 9, Dec. 1957, p. 508-519.

Mechanism of propagation of beta-epsilon transformation in Co-Ni alloys studied in observation of the microstructure of the relief marking with electron microscope. Each marking consisted of three types of tilts brought about by the motion of three kinds of (A/6) [112] type half dislocations. The markings in specimens transformed by external force consisted of tilts of one direction alone as in plastic slips. 8 ref. (N6p; Co, *Ni*)

244-N.* (English.) **Diffusion of Sulfur in Liquid Iron. Pt. 2. Diffusion in Liquid Iron Saturated With Carbon.** Yasuji Kawai. *Tohoku University, Science Reports of the Research Institutes*, Series A, v. 9, Dec. 1957, p. 520-526.

Measurement of diffusion coefficient of sulphur in liquid iron saturated with carbon by use of radioactive sulphur^{35}. Coefficient was found to be 2.9 to 3.5 x 10^{-5} sq. cm. per sec. for the temperature range 1390 to 1560° C. Activation energy was about 7500 cal. Values of diffusion coefficients are more than those of same concentration in iron-sulphur binary solutions. 9 ref. (N1b; Fe, *S*)

245-N. (English.) Effect of Si, Cr and Mn on the Equilibrium of Carbon

and Oxygen in Molten Iron Saturated With Carbon. Pt. 2. Siro Ban-Ya and Sachio Matoba. *Tohoku University, Technology Reports,* v. 22, no. 1, 1957, p. 97-108.

15 ref.
(N14, P12; Fe, C, O, *Si, Cr, Mn)*

246-N. (French.) **Formation of Pro-Eutectoid in Plain Carbon Steels.** C. A. Dube, H. I. Aaronson and R. F. Mehl. *Revue de Metallurgie,* v. 55, Mar. 1958, p. 201-210.

Morphology of pro-eutectoid ferrite in plain carbon steels classified into five major types. Effects of isothermal reaction temperature and time, carbon content, austenite grain size and the competitive formation of pearlite upon the development of each of these types. 21 ref. (N8j; CN)

247-N.* (French.) **Study of the Diffusion of Sulphur in Steels.** A. Kohn. *Revue de Metallurgie,* v. 55, Mar. 1958, p. 265-274.

Specimens in the form of ingots weighing about 250 g. were heat treated in a purified argon atmosphere in the range 900-1300° C. Two of the alloys contained 0.003 and 0.005% S and a third had 0.30% C and 0.28% Mn and about 0.010% S. Results show that some sulphur can dissolve in austenite during annealing and then precipitate at the austenite grain boundaries. 8 ref. (N1e; ST, *S*)

248-N.* (German.) **Recent Research in Steel Transformation.** Erich Greulich. *Draht,* v. 9, Apr. 1958, p. 119-131.

Investigation of steel transformation using structural analysis by means of microhardness measurements. Isothermal transformation diagrams for steels with carbon content to 0.18%. Final hardness between pearlite and martensite phases; transformation in low-alloy steels; tempering diagrams.
(N8; ST)

249-N.* (Japanese.) **Observation With a High-Temperature Microscope of Austenite Structure of Carbon Steels Containing Different Amounts of Aluminum.** Shigeo Hasebe. *Sumitomo Metals,* v. 9, Oct. 1957, p. 207-215.

Heat etching austenite structure was observed at 900, 1000 and 1100° C. Effect on grain growth showed stratiform structure in sample with smaller amount of Al. With higher amounts of Al, austenite grain growth was slower at 900 and 1000° C., but higher at 1100° C. Inhibition of grain growth by nonmetallic inclusions was observed in one sample. Heat etching grain was smaller. A thin ferrite band at the heat etching surface of 0.6% carbon steel after slow cooling and precipitation of small globular carbide at the crystalline interface of 18-8 steel was observed, suggesting that heat etching free surface has the characteristics of grain-boundary surface. Oxidation at the surface of heat etching structure will inhibit austenitic grain growth, as will also the grain-boundary character of heat etching surface. 5 ref. (N8, N3, 2-60; AY, *Al*)

250-N. (Rumanian.) **Kinetics of the Pre-Precipitation Phenomenon in an Alloy of the Duraluminum Type.** M. Protopopescu. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 221-240.

15 ref. (N7b; Al-b)

251-N. (Rumanian.) **Some Problems of the Kinetics of the Isothermal Transformations of a Nodular Graphite Casting in the Solid State. Graphitization, Formation of the Austenite and Decomposition of the Pearlite.** D. Raseev. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 241-264.

12 ref. (N8g; CI-r)

252-N. (Spanish.) **Transformation Mechanism in Heat Affected Zone in Welding of Steel.** Felipe A. Calvo Calvo. *Ciencia y Tecnica de la Soldadura,* v. 8, Jan-Feb. 1958, 16 p.

High-temperature effects in welding of steel; thermal cycle and structural changes; micrographs of metallurgical transformations; hardness and microscopic test at fusion zone. (N8; K9n; ST, 7-51)

253-N. Inert Gas Atoms in Metals. D. E. Rimmer and A. H. Cottrell. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1345-1353.

21 ref. (N15d)

254-N. (German.) **Age Hardening of Titanium Alloys. Age Hardening and Recovery of Titanium-Vanadium Alloys.** W. Knorr. *Technische Mitteilungen Krupp,* v. 15, Dec. 1957, p. 178-193.

24 ref. (N7a; Ti-b, *V*)

255-N.* (Italian.) **Influence of Manganese on the Structural Characteristics of Extruded Sections in AC 11 Alloy.** E. Di Russo and D. Gualandi. *Alluminio,* v. 27, Feb. 1958, p. 55-61.

Influence of Mn content up to 0.65%. Critical cold working in-

creases with increase in Mn content; macrostructure is improved by reduction of recrystallized zone; more uniform mechanical properties are obtained at all points of extruded elements. 5 ref.
(N5, M28, Q-general; Al-f, *Mn*, 4-58)

256-N. (Russian.) **Determination of Speed of Diffusion of Hydrogen in Metals.** R. A. Ryabov and P. V. Rel'd. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 306-308.

Method for studying hydrogen diffusion through metallic membrane at high temperature. 8 ref. (N1a; *H*)

257-N.* **Spiral Growth During Vapor Deposition of Cadmium.** W. I. Pollock and R. F. Mehl. *American Society for Metals, Transactions*, Preprint no. 80, v. 51, 1957, 34 p.

Macroscopic spiral growth of Cd upon the basal hexagonal planes of Cd studied during actual deposition from Cd vapor. These spirals, visible at 75X and having heights between 300 and 2000 Å, originated at ridge boundaries of crystals grown on substrates formed by melting and then freezing deposits of Cd which had been previously sublimed from the vapor phase. 12 ref.
(N15g, N12n; Cd)

258-N.* **Crystal Growth of Silver Metal, Mechanism and Kinetics.** Welby G. Courtney. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1349-1356.

The crystal growth of silver metal whiskers and "ferns" occurring in the reduction of Ag(I) with Fe(II) from aqueous perchlorate solution was directly observed under the microscope. Whiskers frequently grew at well-defined angles to the previous direction and occasionally stopped growing abruptly although nearby whiskers continued to grow. In fern growth, short spikes grew in a regular manner from only one side of a parallel-sided main stem.
(N3r; Ag)

259-N.* **Adsorption and Diffusion of Oxygen on Tungsten.** Robert Gomer and J. K. Hulm. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1363-1376.

Surface diffusion and adsorption of oxygen on tungsten studied by a field emission technique; 80% of the chemisorbed layer can be formed without appreciable activation at 27° K. The layer is stable up to 700° K., where desorption and oxidation start. The latter is markedly dependent on the amount of oxygen on the surface. At 300° K., there is a slow oxygen uptake probably associated with incipient oxidation. (N1a, P13d, W, *O*)

260-N. **Investigation of a Shock-Induced Transition in Bismuth.** Russel E. Duff and F. Stanley Minshall. *Physical Review*, v. 108, Dec. 1, 1957, p. 1207-1212.

Structure of the shock-wave system to be expected in a material which can undergo a polymorphic transition. The slope of the coexistence line in the p-T plane for the transition can be determined from shock-wave measurements at a given initial temperature. Shock waves produced by high explosives were used to investigate the equation of state of bismuth. (N11h; Bi)

261-N.* **Effect of Liquid Media on the Grey Tin ⇌ White Tin Transformation in Commercially Pure Tin.** R. W. Smith and G. V. Raynor. *Physical Society Proceedings*, v. 70B, Dec. 1, 1957, p. 1135-1142.

Dilatometric experiments using xylene, ethyl alcohol, alcoholic "pink salt" solution and distilled water show that the rates of transformation of the alpha→beta and beta→alpha reactions in Sn are affected by the surrounding medium. The alpha→beta rate for material which has undergone one previous beta→alpha change is greater in water or ethyl alcohol than in xylene. All rates increase with temperature up to the highest investigated (29-86° C.), and do not reach a maximum at about 25° C. as reported by earlier workers. (N6p; Sn)

262-N. **Recrystallization of Low-Carbon Steel During Rapid Induction Heating.** B. A. Kuznetsov. *Metallovedenie i Obrabotka Metallov*, no. 2, Feb. 1958, p. 28-35. (Henry Brutcher, Altadena, Calif., Translation no. 4150.)

Study of recrystallization of nonferrous alloys by metallographic and X-ray methods shows that grain size is largely determined by speed of heating. (N5, 2-61; CN-g)

263-N.* (English.) **Production of Oriented Germanium Crystals by the Contact Method.** E. Rubes. *Soviet Physics—Technical Physics*, v. 2, no. 8, (1957), p. 1538-1543.

An application of Czochralski's method has been developed for producing single crystals and bicrystals of Ge, using a Ge contact, from

which crystallization commenced. These crystals are oriented spontaneously in accordance with the temperature field of the apparatus, and are distinguished by well-developed crystal faces. 4 ref.
(N3r, M26n; Ge)

264-N.* (German.) **Transformation Properties of Steel With 12 to 14% Cr.** Walter Peter and Werner Matz. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 807-823.

The transformation properties of steel with 0.07 up to 2.07% C and 12 to 14% Cr are observed metallographically, dilatometrically, through measurements of magnetic saturation, hardness and through X-ray examinations. T-T-T diagrams were obtained in all phases and the austenitization temperature and the influence of carbon contents were investigated. 16 ref.
(N8; SS)

265-N.* (German.) **Influence of Grain Transformation Upon Grain Size and Structure of Ferrite and Austenite of a Carbon Steel of 0.15% C.** Heinz Borchers and Gunther Boxhorn. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 47-56.

Structure transformation during heating between Ac_1 and Ac_3 compared to the structure after repeated hot etching between Ac_1 and Ac_3 and above Ac_3. Repeated grain transformations with slight austenitization resulted in a characteristic small grain size independent of the cooling velocity. Melting at temperatures above Ac_3 suppressed the influence of previous transformations. Heating velocity had no significant influence. 26 ref.
(N8, M27c; CN)

266-N.* (German.) **Contribution to the Development of the System Iron (II)-Oxide, Iron (II) Sulphide, Manganese (II) Oxide and Manganese (II) Sulphide.** Klaus Giessler and Ernst Justus Kohlmeyer. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 57-63.

The equilibrium conditions of the four-component system iron (II) oxide-iron (II) sulphide, manganese (II) oxide and manganese (II) sulphide, and of the corresponding two- and three-component systems are determined by melting in sintered clay crucibles in the Tammann furnace and by thermomagnetic as well as microscopic investigations. The process of solidification and the ensuing reciprocal processes between the oxides and sulphides of Fe and Mn are described especially in the bordering zones between the three-component and the four-component systems. (N12, P12; Fe, 14-68)

267-N. (German.) **On the Quench Aging Process of Conventional Structural Steels in the Range of Climatic Temperatures.** Friedrich-Carl Althof and Dieter Bohm. *Neue Hütte,* v. 3, Feb. 1958, p. 101-109.

Age hardening of commercial structural steel was observed over a period up to 400 days at various temperatures. Quenching from 720° C. and aging at 18° C. over this period resulted in greatest hardness. Tests were carried out on rimming and killed openhearth steels with manganese contents between 0.31 and 0.58%. 17 ref.
(N7a, Q26, 2-61; ST)

268-N.* (German.) **On a Seam-Type Eutectoid in the Transformation Structure of Low and Medium-Alloy Heat Resistant Steels.** Richard Pusch and Hans-Jurgen Schuller. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 65-72.

Investigations on steel with 2 to 2.5% Cr and 1.0% Mo and a steel with 0.13% C, 0.4% Cr, 0.85% Mo and 0.35% V. T-T-T diagrams for continuous cooling obtained by dilatometer measurements, and light and electron microscope observations. The seam-type structures along the ferrite boundaries were of carbidic character and consisted of eutectoid mixture of ferrite and string or band-type carbides. 4 ref. (N8; AY, SGA-h)

269-N.* (German.) **Acoustical Phenomena During Phase Transformation in the System Lead-Tin.** Heinz Borchers and Joseph Kaiser. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 95-101.

Apparatus was developed to measure amount, intensity and frequency of noise. Phase diagram can be developed through study of noises along the liquidus, solidus, eutectic and solid solution lines. Noise during solidification occurs only in metals which contract during solidification, such as Pb and Sn, while noise in the melting process occurs only in metals which contract during melting. 9 ref. (N12, M24b; Pb-Sn)

270-N.* (Polish.) **Mechanism of Sulphurization of Copper-Zinc Alloys.** Lucjan Czerski, Stanislaw Mrowec and Teodor Werber. *Archiwum Hutnictwa,* v. 2, 1957, p. 391-410.

Kinetics of sulphurization scaling and diffusion, in alloys with 1 to 20% Zn. With increasing Zn, the rate of sulphurization decreases. 20 ref. (N1; Cu-b, *Zn, S*)

271-N.* (Portuguese.) **Austenite Transformation: Semi-Stable Lines in the Fe-C Equilibrium Diagram.** Michiyasu Doi. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 95-110.

Semistable lines in the Fe-C equilibrium diagram were calculated from free energies of austenite, ferrite and cementite. 9 ref.
(N8, M24b, P12a; ST)

272-N.* (Portuguese.) **Austenite Transformation: Mechanism of Formation of Pearlite and Bainite.** Michiyasu Doi and Kenkichi Fujimori. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 111-138.

On basis of semistable Fe-C equilibrium diagram, a theory of formation of pearlite and bainite in carbon steels is proposed. Formation of pearlite takes place with simultaneous diffusion of atoms of iron and carbon, and can occur only at high temperatures where mobility of iron atoms is high. Upper bainite would be formed by process similar to formation of pro-eutectoid ferrite; lower bainite would result from mechanism similar to that of martensite transformation. Difference between kinetics of formation of upper and lower bainites can be attributed principally to variations of mobility of carbon atoms with variations in transformation temperatures. 33 ref.
(N8h, N8m; ST)

273-N.* Carbide Precipitation in Several Steels Containing Cr and V. Arun K. Seal and R. W. Honeycombe. *Iron and Steel,* v. 31, May 21, 1958, p. 221-225.

Behavior of an alloy steel on tempering depends primarily on the behavior of the carbide dispersion which is formed. While high-chromium steels do not normally show a secondary hardening peak, secondary hardening or more strictly maintenance of primary hardening does occur because of the presence of Cr_7C_3. Comparison of this behavior with that of a 1% V steel (in which V_4C_3 is the effective precipitate) leads to the conclusion that the various alloy carbides differ in their effects partly because of differences in their tendency to remain as a fine dispersion.
(N8a, N7; AY, *Cr, V*)

274-N.* Creep-Resistant Steels. Effects of Tempering on Some Types Containing Cr, Mo and V. E. Smith and J. Nutting. *Iron and Steel,* v. 31, May 21, 1958, p. 226-235.

Microstructural changes occurring during the tempering of a series of 0.2% C steels containing up to 3% Cr, 1% V and 1% Mo. Hardness determined, microstructures examined by electron microscope. Attempt to identify the precipitated carbides by electron diffraction examination of the carbides on the extraction replicas.
(N8a; AY, *Cr, Mo, V*)

275-N.* Low-Carbon Bainitic Steels. K. J. Irvine and F. B. Pickering. *Iron and Steel,* v. 31, May 21, 1958, p. 235-247.

Retardation of the normal polygonal ferrite formation is achieved most successfully with a ½% Mo-B base composition, and can also be obtained with 1% W-B. It is also possible to use a boron-free higher alloy composition containing at least 0.3% Mo. The steel transforms over a wide range of cooling rates to bainitic ferrite, which has superior mechanical properties to polygonal ferrite, mainly because of a much finer grain size. Grain size is controlled by the transformation temperature, which can be lowered by the addition of alloying elements.
(N8m, 2-60; AY)

276-N.* The Metallography of Low-Carbon Bainite Steels. K. J. Irvine and F. B. Pickering. *Iron and Steel,* v. 31, May 21, 1958, p. 247-255.

A relationship was obtained between tensile strength, transformation temperature and structural features. At high transformation temperatures (the lower tensile-strength level), the strength is largely controlled by grain size and, as the transformation temperature decreases, the grain size decreases and the tensile strength increases. From a detailed examination of the isothermal transformation characteristics, a mechanism can be suggested for the formation of low-carbon bainitic structures. The main feature of this reaction is that bainitic ferrite nucleates by a shear mechanism and carbon diffuses away from the growing ferrite plate.
(N8, Q27a; CN-g)

277-N.* Vanadium and Molybdenum Steels. Effect of Ta and Nb on Tempering. Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel,* v. 31, May 21, 1958, p. 256-263.

Small additions of the strong carbide-forming elements Ta and Cb were made to steels of simple basic composition in which V_4C_3 and Mo_2C were the predominant alloy carbides in the tempering range in which secondary hardening occurs. TaC and CbC possess very high melting points, and thus promote stability in carbide phases with which they form solid solutions. Extent to which these additions influence the stability of the carbide precipitates, and the consequent effect on the secondary hardening phenomenon.

(N8a, N8r; AY, *V, Mo, Ta, Cb*)

278-N.* Transformation Characteristics. Variations Within Samples of an Alloy Steel. W. Steven and D. R. Thorneycroft. *Iron and Steel,* v. 31, May 21, 1958, p. 274-284.

Transformation characteristics of 9-gage wires, derived from the top, middle and bottom of 1¼-ton ingots of B.S. En 24 steel, were not markedly different, the greatest difference between transformation times being of the order 2×. Longitudinal and transverse variations in hardenability that existed within the ingot and between the three sizes of material are due to variations in the intensity of microsegregation of the principal alloying elements Ni, Cr, Mn and possibly of Mo and P. (N12, N8, J5, 2-60; AY)

279-N.* Aging of Pure Iron After Heat Treatment. P. G. Morgan. *Iron and Steel,* v. 31, May 21, 1958, p. 299-300.

Effect of heat treatment on mechanical properties, and of the precipitation of carbon from the solid supersaturated solution by measurement of the electrical resistance at very low temperatures. 5 ref. (N7, J27; Fe-a)

280-N.* Model for Solute Diffusion in Crystals With the Diamond Structure. R. A. Swalin. *Journal of Applied Physics,* v. 29, Apr. 1958, p. 670-674.

A theory for solute diffusion in crystals with a diamond structure, such as Ge and Si, is derived by considering the effect of impurity ion size difference and also the coulombic interaction between impurity ions and charged vacancies. (N1, M26; Ge, Si)

281-N.* Diffusion of Tungsten in Nickel and Reaction at Interface With SrO. Herbert W. Allison and George E. Moore. *Journal of Applied Physics,* v. 29, May 1958, p. 842-848.

Diffusion rates of W in single crystal and polycrystalline Ni were measured between 1100° C. and 1275° C. by using radioactive tungsten-185 and a sectioning technique. Grain boundary diffusion was observed by use of radio-autographs. A simple vacancy mechanism accounts for nearly all of the diffusion; some refinement is required for the transport observed at greater depths. (N1e; W, *Ni*)

282-N. An Improved Czochralski Crystal-Pulling Furnace. K. H. J. C. Marshall and R. Wickham. *Journal of Scientific Instruments,* v. 35, Apr. 1958, p. 121-125.

This apparatus differs from previous designs in that it combines rapidity of set-up with ease of operation and almost perfect vision during the crystal-growing cycle. The heating element is of resistance heated graphite and provision is made for growing either in vacuum or in an inert gas atmosphere. 11 ref. (N3r, X24f; Ge, Si)

283-N. Diffusion of Iron, Cobalt, and Nickel in Single Crystals of Pure Copper. C. A. Mackliet. *Physical Review,* v. 109, Mar. 15, 1958, p. 1964-1970.

The rates of diffusion of radioactive tracers of Fe, Co and Ni in single crystals of pure Cu measured as a function of temperature from about 700 to 1075° C. 31 ref. (N1a, 2-61; Cu, *Fe, Co, Ni,* 1-59, 14-61)

284-N. Diffusion of Argon in Silver With an Appendix on the Diffusion of Rare Gases in Uranium. A. D. Le Claire and A. H. Rowe. *United Kingdom Atomic Energy Authority,* AERE M/R 1417, 1957, 35 p.

21 ref. (N1a; Ag, U, EG-m43)

285-N. Calculation of Volumes of Activation for Diffusion in Solids. Robert W. Keyes. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report,* Pt. 4. Mar. 1958, p. 58-74.

28 ref. (N1c, P13a)

286-N.* (English.) Influence of Heat Treatment on the Strain-Aging of Aluminum-Killed Steel. P. Szeki. *Acta Technica,* v. 20, no. 1-2, 1958, p. 145-151.

Impact tests were made at various temperatures to determine brittle

transition temperatures of variously heat treated steels. Tendency for strain aging is least if after combining with oxygen there is still enough Al for combining with nitrogen and if before cold working steel is heat treated so as to precipitate nitrogen in form of finely dispersed AlN—for example, by quenching as quickly as possible from temperatures which slightly exceed A_3 and tempering below 700° C. 7 ref.
(N7e, 2-60, 2-64; ST-c, CN-g)

287-N.* (English.) **Isothermal Transformation of Austenite in Carbon Steels Containing 0.50 Per Cent C and 0.18 Per Cent C.** Sten Modin. *Jernkontorets Annaler,* v. 142, no. 2, 1958, p. 37-79.

Electron and light microscope investigation. Pearlite and bainite structures formed on isothermal transformation at times from 1 sec. to 30 min. and at temperatures from 350 to 700° C. 18 ref.
(N8g, N8h, N8m, 2-60, 2-61; CN-g)

288-N. (English.) **Diffusion of Lead in Lead Telluride.** B. I. Boltaks and Iu. N. Mokhov. *Soviet Physics-Technical Physics,* v. 1, no. 11, 1957, p. 2366-2368.

7 ref. (N1; Pb, Te)

289-N. Diffusion and Solubility of Silver in Germanium. A. A. Bugai, V. E. Kosenko and E. G. Miseliuk. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 1553-1557. (Translation by American Institute of Physics, Inc.)

The solubility and diffusion of Ag in Ge studied by radioactive tracer method. Results compared with the interstitial diffusion theory of Wert and Zener. 9 ref.
(N1e, N12p; Ag, *Ge*)

290-N.* (German.) **Contribution on Quench Aging of Mild Unalloyed Steel on the Basis of Observations on Recovery.** Matthias Nacken and Herbert Sturies. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 235-240.

Study of aging and recovery by measuring torsion oscillation damping. Results of experiments on bessemer steel and high-purity iron.
(N7a, N4; ST-g, Fe-a)

291-N.* (German.) **Age Hardening of Titanium Alloys.** Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 179-184.

Dependence of hardness on grain orientation. Age hardening of mixed alpha and beta crystals. Hardness in case of martensite formation and in the presence of omega phase. Age hardening after quenching from alpha-beta range. Influence of annealing temperature. (N7a; Ti)

292-N.* (German.) **Age Hardening and Phase Alterations During Beta-Alpha Titanium Transformation in Titanium-Cobalt Alloys.** Ernst Raub and Hans Beeskow. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 185-190.

Hardness measurements, radiographic and metallographic study of beta-titanium alloys stabilized by cobalt. Transformation mechanism and its dependence on composition of alloys and heat treatment. Effect of omega-phase segregation on hardening. According to results of radiographic investigations presence of another intermediate phase is possible. (N7a, N6; Ti, *Co*)

293-N.* (German.) **Investigation on Precipitation in a Constant Temperature Gradient.** Horst Böhm. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 190-194.

Experimental technique. Investigation of a Ti alloy with 7% Mn, and of an Al alloy with 4.5% Cu. Results of hardness measurements and metallographic examination. Advantages of the proposed method.
(N7b; Ti-b, *Mn,* Al-b, *Cu*)

294-N.* The Effect of Some Common Alloying Elements on the Volume Change at Ac_3 of a 0.35% Carbon Steel. A. S. Kenneford. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 135-138.

Dilatometric investigation shows that Si and Mo and possibly also V, reduce the volume change at Ac_3, whereas Mn, Cr, Ni and Co have the opposite effect. These volume changes can affect those taking place at the Ms temperature, and consequently also the susceptibility of a steel to cracking on quenching. 4 ref.
(N8, P10d, 2-60; AY)

295-N.* Can an Improved Nonaging Steel be Produced Commercially? Eric R. Morgan. *Metal Progress,* v. 73, June 1958, p. 88-94.

The successful development of an improved nonaging steel to replace aluminum-killed steel awaits the careful coordination of chemical composition, precise annealing and a special temper rolling technique. 6 ref. (N7, F23r, J23; CN-g)

296-N. Formation Mechanism of Graphite Nuclei. A. F. Landa and V. D. Yakhnina. *Metal Progress,* v. 73, June 1958, p. 152-153. (From

Metallovedenie i Obrabotka Metallov, no. 12, 1956, p. 46-50).

(N8s, 2-64; CI-p)

297-N. Change of Length During Transformation of Iron Under Stress. *Nature,* v. 181, May 17, 1958, p. 1396-1397.

(N6p, P10d; Fe, 3-66)

298-N. Effect of Primary Alpha on the Beta Decomposition of Zirconium-Uranium-Oxygen Alloys. David L. Douglass and Lyle L. Marsh. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1249, Jan. 14, 1958, 16 p. (Order from Office of Technical Services, Washington 25, D. C.) $.75.

Effect of primary alpha present during the solution treating cycle on the incubation period for the decomposition of beta and on the resultant structure was determined for Zr-base alloys containing from 7 to 15% U and from 0.094 to 0.29% O. 6 ref. (N6p; Zr, *U, O*)

299-N. Effects of Transformations and Precipitations on Strength. E. P. Klier. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB131280 and PB131281, p. 84-102.

Those heat treatments which lead to usable high tensile strengths universally do so by the development of a fine precipitate structure which is distributed uniformly through a suitable matrix. Data for a 5% Cu-Al alloy and 4340 steel. (N7, Q27a; Al, *Cu,* AY)

300-N.* (French.) **Influence of Axial Compression on the Allotropic Beta→Alpha Transformation of High-Purity Titanium.** Paul Costa and Georges Cizerin. *Comptes Rendus,* v. 246, Apr. 14, 1958, p. 2261-2263.

Under the effect of a slight axial compression, Ti undergoes abnormal lengthwise contraction during passage from beta to alpha phase. This can be explained by a shear mechanism of the beta lattice on a single preferred plane among all possible planes. Phenomenon occurs only in high-purity Ti. (N6p; Ti-a)

301-N.* (Japanese.) **Grain Growth in a Cold Rolled Aluminum Single Crystal.** Shiro Kohara. *Light Metals (Tokyo),* v. 8, Mar. 1958, p. 4-8.

The crystal was rolled on the (110) plane, in the (112) direction. Artificial nucleation was applied by scrubbing with emery paper, then the specimen was annealed at 350° C. for 600 sec. Grains on scrubbed side had an equiaxial shape and random orientation; those on unscrubbed side were of elongated shape in two directions, related to the matrix by a rotation around (111) axes. A deformed single crystal matrix not fully symmetrical for the growth rates of recrystallized grains is suggested. 18 ref. (N3r; Al)

302-N. (Russian.) **Volumetric Measurement of Steel Transformation by Dilatometric Curves.** Yu. A. Kocherzhinskii. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 437-439.

4 ref. (N8, M23b; ST)

303-N. Experimental Studies on Grain Growth in Metals. H. U. Astrom. *Arkiv för Fysik,* v. 13, 1958, p. 60-80.

Study of interfacial grain-boundary energies by the calorimetric method. (N3, M23r)

304-N.* Effects of Strain-Rate and Temper Rolling on the Strain-Aging Characteristics of Rimmed Deep-Drawing Steel. D. H. Fisher, R. L. Carlson and W. T. Lankford. *American Society for Testing Materials, Preprint no. 87,* 1958, 11 p.

Effects after aging times of 29, 150 and 800 hr. investigated for two amounts of temper rolling extension (1.2% and 2.3%) at strain rates varying from 0.001 to 0.4 per sec. Commercially temper-rolled material was used, and all tests were performed at room temperature. 8 ref. (N7e; ST-d)

305-N.* Direct Observation of the Strain Field Produced by Coherent Precipitated Particles in an Age-Hardened Alloy. R. B. Nicholson and J. Nutting. *Philosophical Magazine,* v. 3, May 1958, p. 531-533.

Transmission electron micrographs of aged 4% Cu aluminum alloy foils show unusual contrast near precipitated particles. This is interpreted in terms of Bragg diffraction from regions distorted by elastic coherency strains between the precipitate and the matrix. 6 ref. (N7a; Al, *Cu*)

306-N. Time Decrease of Permeability in Iron. A. J. Bosman, P. E. Brommer, H. J. Van Daal and G. W. Rathenau. *Physica,* v. 23, Nov. 1957, p. 989-1000.

The time decrease of initial permeability has been studied for Fe

containing interstitial nitrogen. The activation energy for nitrogen diffusion is derived from this. A method for resolving the different relaxation times is given. 14 ref.
(N1h, P13a; Fe, *N*)

307-N. Influence of Pressure on the Mean Time of Stay of Interstitial Nitrogen in Iron. A. J. Bosman, P. E. Brommer and G. W. Rathenau. *Physica,* v. 23, no. 11, Nov. 1957, p. 1001-1006.

9 ref. (N1c, 3-74; Fe, *N*)

308-N. On the Diffusion of Indium, Antimony and Tellurium in Indium Antimonide. B. I. Boltaks and G. S. Kulikov. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 67-68. (Translation by American Institute of Physics, Inc.)

Study of semiconducting materials to clarify effect of impurities on their physical properties. 9 ref.
(N1e, 3-69; In, Sb, Te)

309-N. (Czech.) **Crystallization of Dendrites From Aqueous Solutions.** Vladimir Koselev. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 299-308.

Study of conditions resulting in modification of normal crystallization into dendritic and globular types. Mechanism of dendritic crystallization; similarity of dendritic crystals from aqueous solutions and those obtained during solidification of melt as in the case of steel.
(N3b; ST)

310-N.* (Czech.) **Transformation Diagrams of Continuous Cooling for 9 Czechoslovak Steels.** Jaroslav Vana. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 308-313.

Diagrams plotted using combination of dilatometric method for region of low cooling velocities and Liedholm's method of interrupted hardenability tests for region of middle and higher cooling velocities. 14 ref. (N8; AY)

311-N.* (German.) **Relaxation Diffusion and Grain Coarsening in Aluminum.** F. Erdmann-Jesnitzer and H. Hadamovsky. *Aluminium,* v. 34, May 1958, p. 254-263.

Aluminum specimens containing 0.075 and 0.2% Fe which were 70% reduced at 200° C. were annealed at 600° C. and quenched in water, 99.5% cold reduced and then recrystallized by heating for 4 sec. at 560° C. and 3 hr. at 300° C. Critical reductions were followed by recrystallization at different rates of heating. Critical reduction is defined as that reduction for which at specified annealing temperature the deformed structure is just completely recrystallized by grain growth. Effect of relaxation diffusion is greatest at low solubility of alloying elements, particularly when combined with supersaturation.
(N5, Al)

312-N.* (Russian.) **Effect of Heating Speed on the Irregular Concentration of Carbon in Austenite During Hardening.** A. G. Spektor. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 142-149.

It is known that brief heating of steel results in uneven distribution of carbon liberated from the carbide phase. It is possible to show two basic causes for microscopic irregularity of austenite. The first has its source in the irregular dispersion of the carbide phase in the resulting structure. The other aspect of nonhomogeneous solution appears to be the natural consequence of spacial discontinuity of the carbide phase. 5 ref.
(N8, 3-67; ST)

313-N.* (Russian.) **Effect of Recrystallization on Texture in Low-Carbon and Silicon Steels.** K. V. Grigorov, G. P. Blokhin and M. Ya. Zakutner. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 150-153.

Change of texture investigated by magnetometric methods in cold rolled and transformer (silicon) steel during alpha-gamma transformation. Intense weakening takes place in the structure but does not disappear completely. 8 ref.
(N5, M26c; CN-g, AY, *Si*)

314-N. Aging Characteristics of Nickel-Chromium Alloys Containing Appreciable Amounts of Titanium and Aluminum. Neil E. Rogen and Nicholas J. Grant. *American Society for Testing Materials, Preprint,* no. 82, 1958, 12 p.

Aging characteristics and high-temperature strength of vacuum melted, wrought Ni-Cr-Ti-Al alloys. 8 ref. (N7a, Q27a, 2-62; Ni, Cr, *Ti, Al*)

315-N. Diffusion in Metals. *Industrial and Engineering Chemistry,* v. 50, Mar. 1958, p. 492-495.

Literature review covering chemical diffusion in alloys; self-diffusion in alloys; diffusion in pure metals; grain boundary diffusion; interstitials. (N1)

316-N. Crystal Growth of Cobalt Electrodeposited on Copper Single

Crystal. Seiji Fukuda. *Japan Journal of Applied Physics,* v. 27, Apr. 1958, p. 236-242.

7 ref. (N12d; Cu, *Co*)

317-N. Study of Precipitate Particles in Cu-Co Employing Ferromagnetic Resonance. D. S. Rodbell. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 311-312.

6 ref. (N7b, P16f; Cu-b, Co-b)

318-N.* Survey of Factors Affecting the Properties of Gray Iron. L. J. Huetter and H. H. Stadelmaier. *North Carolina State College, Engineering School Bulletin,* no. 66, Feb. 1958, p. 5-24.

Relations between properties and microstructure. Shape and size of the graphite particles outweighs the influence of metallic matrix. 42 ref. (N8s, Q-general; CI-n)

319-N. Fission Gas Behavior in the Uranium-Aluminum System. Myron B. Reynolds. *Nuclear Science and Engineering,* v. 3, Apr. 1958, p. 428-434.

Data on diffusion of fission Krypton from irradiated 20% U-Al alloy. (N15d, M24b; U, Al-b, 2-67)

320-N. The Solution of Inert Gas Atoms in Metals. D. E. Rimmer and A. H. Cottrell. *Philosophical Magazine,* v. 2, Nov. 1957, p. 1345-1353.

21 ref. (N15d, N16m)

321-N. Ordering and Disordering Processes in Cu_3Au. I. Leonard, R. Weisberg and S. L. Quimby. *Physical Review,* v. 110, Apr. 15, 1958, p. 338-348.

Isothermal change of Young's modulus with time in a single crystal of Cu_3Au following a sudden change in temperature below the critical temperature when a specimen is initially in various states of equilibrium long-range order. (N10a, Q21a, Cu, Au, 14-61)

322-N. The Transition Temperature of the Transition Between Grey and White Tin. G. V. Raynor and R. W. Smith. *Royal Society, Proceedings,* v. 244, Feb. 1958, p. 101-109.

6 ref. (N6p; Sn)

323-N.* The Effect of Alloy Structure on the Diffusion Process. L. M. Mirskii. *United Kingdom Atomic Energy Authority,* AERE Lib/Trans 773, 1957, 16 p.

The data obtained can be used in making new alloys and in designing diffusion processes for coating alloys. The method used permits determination of diffusion coefficients of both components in the compound (other methods measure the diffusion of one component only); autoradiography shows the distribution of the alloy components; the picture of atomic migrations in the lattice obtained is nearer to reality than that obtained by other methods. 18 ref. (N1)

324-N. Growth of Single-Crystal Layers of Silicon and Germanium From the Vapor Phase. N. N. Sheftal', N. P. Kokorish and A. V. Krasilov. *Academy of Sciences of the USSR, Bulletin of,* v. 21, no. 1, 1957, p. 140-150. (Translation by Columbia Technical Translations.)

13 ref. (N15g; Si, Ge, 14-61)

325-N. Recrystallization Diagram of Chromium. E. M. Savitsky, V. F. Terekhova and A. V. Kholopov. *Academy of Sciences of the USSR, Proceedings,* v. 109, July-Aug. 1956, p. 485-487. (Translation by Consultants Bureau, Inc.)

4 ref. (N5f; Cr-a)

326-N. Effect of Plastic Deformation on Martensite Formation. M. G. Gaidukov and V. D. Sadovskii. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 2-7. (Henry Brutcher, Altadena, Calif., Translation no. 4180.)

Austenitic steel specimens alloyed with various percentages of Mn, Cr and Ni were tested for stability of transformation of austenite into martensite under plastic deformation. Stability was found to depend essentially on the relative position of the martensite point and the deformation temperature as well as on chemical composition of the steel and a number of other factors. 7 ref. (N8p, 3-68; AY)

327-N. Strain Hardening, Recrystallization, and Hot Strength of Alloyed Austenite. L. A. Metashop and M. E. Blanter. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 7-9. (Henry Brutcher, Altadena, Calif., Translation no. 4181.)

Relation between strain hardening, the softening process in heating and the characteristics of long and short-time strengths at high temperatures were determined for an austenitic steel with the composition 0.38% C, 0.58% Si, 1.4% Mn, 12.67% Cr, 7.6% Ni, 1.13% Mo, 1.31% V, 0.48% Nb, 0.008% S and 0.015% P. The effects of additional amounts of Cr, Ni, Co and Mo were further studied. (N7e, N5, Q27a, 2-62, 2-60; SS)

328-N. Effect of High-Temperature Aging on the Structure and Proper-

ties of 18-8 Steel. Kh. I. Cheskis and S. I. Volfson. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 16-25. (Henry Brutcher, Altadena, Calif., Translation no. 4183.)

A systematic study by metallographic magnetic saturation and electrical resistivity methods of the effect of long-time heating (up to 10,000 hr.) at 500-900° C. on the properties of standard 18-8 steels. 8 ref. (N7, Q-general; SS)

329-N. Effect of Magnesium on the Graphitization of White Cast Iron. A. V. Chernovol and Yu. N. Taran. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 49-51. (Henry Brutcher, Altadena, Calif., Translation no. 4189.)

Microstructural analysis of white cast iron (containing 3.0% C, 0.52% Si, 0.32% Mn, 0.021-0.002% S, 0.09% P and 0.01, 0.047, 0.76, and 0.093% Mg) showed no appreciable effect of Mg on the structure. Experimental data did not confirm the hypothesis that the formation of spheroidal graphite resulted in the formation of low-stability carbides in Mg cast iron, nor any sharp slowing down of the graphitization. 5 ref. (N8s, M27, 2-60; CI-r, *Mg*)

330-N.* (Rumanian.) **Structure and Magnetic Properties of Several Alloys of the System Fe-C-Al.** N. Geru, P. Iliescu, A. Moroianu and E. Crucianu. *Studii si Cercetari de metalurgie,* v. 2, no. 4, 1957, p. 397-413.

Structural changes produced by simultaneous increase in carbon (1.1-2.3%) and Al content (3-12%) were analyzed by parallel microscopic and thermomagnetic studies. The cementite was found to change its composition gradually with increase in the Al content; with more than 8% Al, a new epsilon phase with different properties from the cementite, its own characteristic lattice and interesting magnetic properties were obtained. 5 ref. (N8, P16; Fe, *C, Al*)

331-N. (Russian.) **Abnormal Softening of Lead-Tin Alloys at Room Temperature.** L. N. Larikob. *Doklady Bolgarskoi Akademii Nauk,* v. 10, Jan-Feb. 1958, p. 65-68.

(N7; Pb, Sn)

332-N.* Production of Graphite Single Crystals by the Thermal Decompoistion of Aluminum Carbide. L. M. Foster, G. Long and H. C. Stumpf. *American Mineralogist,* v. 43, Mar-Apr. 1958, p. 285-296.

Aluminum carbide, Al_4C_3, dissociates in the vicinity of 2200-2500° C., at atmospheric pressure, to Al vapor and graphitic carbon. Under suitable geometry and heating conditions large, pure, single crystals of graphite can be produced. The crystals have an unusual morphology. In no case is the macroscopic hexagonal symmetry evident. All crystals show growth lines and steps that presumably carry over from the carbide precursor. Twinning and cleavage are common but less frequent than in graphite from other sources. 9 ref. (N3r; NM-k36, 14-61)

333-N.* Time Decrease of Permeability in Iron. G. W. Rathenau. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 239-242.

Measurements on iron containing interstitial nitrogen. Relaxation phenomena with different relaxation times can be resolved. Unequal initial stiffness of the domain walls gives rise to satellites of the main relaxation. Activation energy of the main relaxation and its satellites coincides with that known for bulk diffusion. Short demagnetization of the relaxed material prior to time decrease results in wall movement during the measurement and in apparent longer relaxation times. Method has been applied for the determination of the activation volume for interstitial diffusion. Preliminary results of measurements on single crystals given. 10 ref. (N1; Fe, *N*)

334-N.* (German.) **Critical Consideration of the Formation of Spheroidal Graphite in Cast Iron.** Erich Scheil and Adalbert Wittmoser. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 256-267.

Three possible types of formation are considered: indirect formation from ledeburite decomposition, direct origin from melt and indirect development from gamma solid solution. (N8s; CI-r)

335-N.* (Japanese.) **Solidification of Pure Aluminum. Pt. 7. The Solidification Constant.** *Light Metals,* no. 30, May 1958, p. 5-10.

When molten Al is cooled by water or mold, and the directional solidification is fixed, the relation between the solidification time (t) and the depth of solidified part (x) is shown by a formula $x = q\sqrt{t}$. The solidification constant (q) contains several variables: temperature of molten Al, cooling water, mold

and thermal properties of solid and liquid Al. Temperature of the molten Al has the most significant influence on the solidification constant. 27 ref. (N12; Al-a)

336-N.* (Japanese.) **Aluminum-Magnesium Casting Alloys. Pt. 5. Investigation of Precipitation of Beta Phase.** Nakamura Yasuji. *Light Metals,* no. 30, May 1958, p. 15-20.

Range of Si content that precipitates the secondary beta phase is 0.06% Si for Al with 10% Mg and 0.03% Si and 0.25% Si for 7% Mg and 13% Mg alloy respectively. (N7, 2-60; Al-b, *Mg, Si*)

337-N.* (Japanese.) **Aging of Al-Cu Alloy by Means of Specific Volume Analysis.** Morinaga Takuichi, Zaima Shigeo and Koshiishi Kazuo. *Light Metals,* no. 30, May 1958, p. 21-25.

Aging of three Al-Cu alloys: 3.116% Cu, 4.240% Cu and 6.200% Cu, respectively. After being kept at 500-520° C. for 30 min., specimens are quenched in water and receive tempered aging at the prescribed temperature. Change of specific volume is then measured. 5 ref. (N7, P10d; Al-b, *Cu*)

338-N.* (Japanese.) **Kinetics of Reaction of Commercially Pure Titanium and Titanium Alloys With O_2, H_2 and N_2.** Kusamichi Hidetake, Yagi Yosiro, Yukawa Toru and Noda Tadao. *Light Metals,* no. 30, May 1958, p. 38-41.

Sponge Ti prepared by the Kroll process and alloying element were arc melted by the consumable electrode double-melting method, and the ingot was forged at 900°, annealed in argon atmosphere at 700° C. and degassed in vacuo. Evolved hydrogen was collected by means of a Bentells pump and measured. (N16m, E25s; Ti, *O, H, N*)

339-N.* (Russian.) **Dispersal of Alloying Elements in Austenic Chromium-Tungsten Steels and Alloys With Varying Nickel Content.** N. F. Lashko and E. Ya. Rodina. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 261-267.

Phase analysis of austenitic steel with 20-60% Ni and variable W, V and Cb as compared with endurance limit tests. Increase in Ni content reduces solubility of carbon and results in corresponding change in composition of hard alloys, and their heat resistant properties. Addition of 1 to 4% V to alloys containing 20% Cr, 60% Ni and 9% W, gives rise to Me_2C type primary carbide on the basis of metastable carbide Cr_2C containing V and W. (N8r, 2-60; SS, SGA-h)

340-N.* **Solubility and Diffusion of Carbon in a Silicon-Iron Alloy.** D. A. Leak and G. M. Leak. *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 256-262.

Volume diffusion occurs by the same interstitial mechanism as is observed in alpha-iron containing carbon. Carbon atoms in solution also are associated with Si atoms in a similar way to earlier observations on nitrogen in Si-Fe. The solubility of carbon in equilibrium with a precipitated carbide is considerably lower than that for carbon in alpha-iron. 23 ref. (N1e; AY-b; C)

341-N.* **Anodic Disintegration of Austenite of a Rimming Steel During Electrolytic Polishing in Melted Salts.** Zygmunt Wojcik. *Metaux Corrosion-Industries,* no. 392, Apr. 1958, p. 163-170.

Specimens taken from the pure zone of the blooms of a 0.12% C, 0.51% Mn, 0.014% P, 0.026% S rimming steel were austenized for 1 hr. at 1100° C., and immediately subjected to electrolytic polishing at 900-950° C. and the surface features studied with an electron microscope. Anodic disintegration is compared with the inverse of crystal growth from a few secondary centers. 10 ref. (N8, L13p; ST-d)

342-N.* **Mass Spectrometer Measurements of the Diffusion Coefficient of Hydrogen in Steel in the Temperature Range of 25°-90° C.** Robert C. Frank, Don E. Swets and David L. Fry. *Journal of Applied Physics,* v. 29, June 1958, p. 892-898.

Diffusion coefficients for hydrogen in mild steel measured in the temperature range 25 to 90° C. A mass spectrometer was used to study the movement of hydrogen through thin steel plates. Two methods of measuring diffusion have been used: the rate of approach to equilibrium when hydrogen is supplied to the plate; the rate of outgassing when the source of hydrogen is removed. 14 ref. (N1a, S11c; ST, H, 4-53)

343-N.* **Ratio of the Diffusion Coefficients for the Diffusion of Hydrogen and Deuterium in Steel.** Robert C. Frank, Robert W. Lee and Robert L. Williams. *Journal of Applied Physics,* v. 29, June 1958, p. 898-900.

Ratio of the diffusion coefficients for hydrogen and deuterium in steel measured in the temperature range of 26 to 86° C. A mixture of the two gases was introduced into the steel by abrasion in a mixture of normal and heavy water. The diffusion coefficients were measured simultaneously for the two using the mass spectrometer to observe the rate of evolution of the gases from the steel. 6 ref. (N1a; ST, H)

344-N. Solid-State Dissolution of Germanium by Indium in Semiconductor Devices. John Roschen and C. G. Thornton. *Journal of Applied Physics*, v. 29, June 1958, p. 923-928.

Development of small pits or cavities has been observed in Ge semiconductor devices with In metal to Ge semiconductor contacts at temperatures below the melting point of In. The mechanism of cavity formation is a solid-state dissolution of Ge by In with a subsequent more rapid diffusion of Ge in the In, limited by the solid solubility of the Ge in the In. 8 ref. (N1; Ge, In)

345-N.* Study of Order in Annealed and Irradiated Alpha Brass by Lattice Parameter Meaurements. R. Feder, A. S. Nowick and D. B. Rosenblatt. *Journal of Applied Physics*, v. 29, June 1958, p. 984-988.

Increase in short-range order in alpha brass (25 and 30% Zn) produced by thermal treatment or neutron irradiation is accompanied by a measurable decrease in lattice parameter (up to 0.02%). The equilibrium values of the lattice parameter decrease markedly with annealing temperature in the lower range of the measurements (i.e., in the vicinity of 125° C.). The activation energies are given. 13 ref. (N10, 2-64, 2-67; Cu-n)

346-N.* (Italian.) **X-Ray Diffraction Determination of Recrystallization Curves of Reflectal 05 Alloy.** M. Paganelli. *Alluminio*, v. 27, June 1958, p. 263-266.

Study of recrystallization range for 1-hr. anneal revealed that for each degree of prior cold working, temperature of end of recrystallization of Reflectal is higher than that of Raffinal. (N5f; Al-b)

347-N.* (French.) **Diffusion and Chemical Control in the Dissolution of Metals in Mercury.** J. A. R. Bennet and J. B. Lewis. *Journal de Chimie Physique*, v. 55, Feb. 1958, p. 83-90.

Rates of dissolution of cylinders of Pb, Sn and Zn studied and results compared with dissolution of benzoic acid in water, as latter is known as a controlled diffusion process. Whereas dissolution of Pb and Sn is also a controlled diffusion process, it has been found that dissolution of Zn is partially due to a chemical process. To obtain reproducible agitation conditions, coaxially arranged cylindrical specimens were mounted in a revolving cylinder containing Hg. Experiments with Zn monocrystals showed that the different crystallographic faces had different speeds of dissolution. Same phonomenon was noted, qualitatively, for Bi and Cd. 6 ref. (N1a, R2g; Hg, Pb, Sn, Zn)

348-N.* The Martensite Transformations of the Beta Phase in Copper-Aluminum-Nickel Alloys. D. Hull and R. D. Garwood. *Institute of Metals, Journal*, v. 86, July 1958, p. 485-492.

Two types of martensite transformation of the metastable beta phase were observed in an alloy containing 79.5% Cu, 12.8% Al and 7.7% Ni. Both types of martensite form isothermally when the alloy is aged at room temperature after a suitable heat treatment. 24 ref. (N6q; Cu, *Al*, *Ni*)

349-N.* Kinetics of the High-Temperature Heterogeneous Reaction of Chlorine and Nickel Between 1200 and 1700° K. John D. McKinley, Jr., and Kurt E. Shuler. *Journal of Chemical Physics*, v. 28, June 1958, p. 1207-1212.

The kinetics of the reaction of gaseous chlorine with metallic Ni investigated in a constant-pressure flow system in temperature range from 1200 to 1700° K. and at chlorine pressures between 0.08 and 0.4 mm Hg. (N15d, R6q; Ni, *Cl*)

350-N.* On the Growth of Metal Whiskers by Hydrogen Reduction of Halides. W. W. Webb and E. F. Riebling. *Journal of Chemical Physics*, v. 28, June 1958, p. 1242-1245.

Observations of pressures of hydrogen and hydrogen halide gases prevailing during growth of a variety of metal whiskers by hydrogen reduction of volatile metal halides. (N3r; Ag, Cu, Fe, Co, Ni, Mn)

351-N.* (English.) **Contributions to the Study of the Gamma-Alpha Transformation Without Diffusion in Fe-C Alloys.** Butu Rotenstein, Sofia Calogniru and Teodor Teitel. *Revue de*

Métallurgie (Bucarest), v. 3, no. 1, 1958, p. 99-108.

Experimental curves showing variation of the total quantity of the alpha phase as a function of the time for various initial temperatures of the test bar. The determining factor of the transformation without diffusion is the temperature at which this transformation takes place and not the tensions caused by the sudden cooling. 22 ref. (N8; ST)

352-N.* (French.) **Radio-Isotopes in Industry and Metallurgy.** *Métallurgie et la Construction Mécanique*, v. 90, June 1958, p. 449-461.

Use of radio-isotopes to study metallurgical reactions, solidification of metals, the influence of slags and impurities, the movement of the charge and gases and durability of refractories. (N12, S18q, 1-59; RM-h)

353-N.* (German.) **Growth and Characteristics of Metal Whiskers.** F. Blaha. *Radex-Rundschau*, No. 7, Dec. 1957, p. 882-890.

Growth of metal filaments; mechanical peculiarities of whiskers; theories on manner of origin of filaments; interpretation of the mechanical properties according to crystal models. (N3r, N12, 14-61)

354-N.* **Gray Tin Single Crystals.** A. W. Ewald and O. N. Tufte. *Journal of Applied Physics*, v. 29, July 1958, p. 1007-1009.

Method of growing gray tin single crystals from a liquid amalgam. Apparatus and specification of the conditions of growth. 9 ref. (N3r, N12; Sn-a, 14-61)

355-N. **Conditions for Stability of Graphite, Iron and Its Oxides and Carbides.** D. I. Cameron. *Iron and Steel Institute, Journal*, v. 189, July 1958, p. 251-255.

In dealing with iron, carbon and oxygen simultaneously, the two carbides and three oxides cause complications. A simplified method of presentation in terms of the CO and CO_2 percentages of the gases in equilibrium has been worked out to show the regions of stability for Fe_2C, Fe_3C, Fe, FeO, Fe_3O_4, and graphite. 7 ref. (N15d; C, Fe, O)

356-N. **Effect of Boron on Grain Size of Steel.** L. L. Pyatakova and O. D. Zhizhakina. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 27-30. (Henry Brutcher, Altadena, Calif., Translation no. 4220.)

Confirms influence of small additions of boron on the grain growth during heating. The initial temperature of grain growth may be increased by deoxidation and alloying with ferrotitanium. The effect of hot working on the threshold temperature of grain growth was confirmed. The irregularity of grain growth is caused by uneven distribution of boron along grain boundaries. 6 ref. (N3, 2-60; ST, *B*, *Ti*)

357-N. (English.) **Energy of Activation of Self-Diffusion in Some Metals.** Ram Gopal. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 293, Dec. 1957, p. 53-55.

(N1d)

358-N. (Chinese.) **Recrystallization Texture of Cold Rolled Copper Strips.** Y. Ming-Kao and C. Pang-Hsin. *Acta Physica Sinica*, v. 14, Mar. 1958, p. 95-135.

The change from rolling texture to recrystallization texture may be described as a rotation of 45°, 22°, 38°, about a common (111) axis. Different rates of heating and different annealing procedures produced no significant effect. Temperature of annealing was the main factor. (N5, M26c, 2-64; Cu, 4-53)

359-N.* (French.) **Orientation Relationships Between an Unstable Gamma Phase and the Alpha Phase Resulting From Plastic Deformation of the Latter. Tempering of This Alpha Phase.** Paul Bastien and Rene Margerand. *Comptes Rendus*, v. 246, June 9, 1958, p. 3238-3240.

Corrosion figures were used to study the <110> gamma→ <111> alpha orientation relationship previously revealed by X-ray diffraction of an unstable 18-8 austenitic steel subjected to cold plastic deformation. Tempering of the alpha phase is accompanied by germination and grain growth and leads to a disoriented austenitic phase. (N3, N8a, 2-64, 3-68; SS)

360-N. (German.) **Application of Quantitative Autoradiography in Diffusion Examination of Metals and Alloys.** W. Posch. *Atompraxis*, no. 4, 1958, p. 123-127.

14 ref. (N1c, M23q)

361-N. (German.) **Recovery of Pure Aluminum After Cold Forming.** Gottfried Loeschner. *Bergakademie*, Dec. 1957, p. 600-606.

(N4, G1; Al-a)

362-N.* (German.) **Crystal Growth in Sintered Carbides.** Bohuslav Cech.

Neue Hütte, v. 3, May 1958, p. 300-302.

On some Cr, Cr_2-Ni alloys the relations between structural characteristics and strength of carbides are investigated. Grain size of the carbide component as previously observed on WC + Co and Ti + Ni carbides is determined. Influence of the binding component, in particular its crystal size, upon the strength properties of Cr_3C_2-Ni alloys. Grain size depends largely on the sintering time. 9 ref.
(N3m; Cr, Ni, 6-69)

363-N.* (German.) **Influence of Annealing Time Upon the Pearlite-Cementite Phase in a Carbon Steel With 0.86% C.** Helfrid Modin. *Neue Hütte*, v. 3, May 1958, p. 305-306.

Specimens 0.8 mm. thick are heated at 1100° C. and then transferred into a metal bath of 650° C. for times of 2 sec. up to 50 hr. After only 10 sec. about 90% of the austenite was transformed into pearlite. Microstructure observed under light and electron microscope. Microhardness as function of annealing time. (N8h, 2-64; ST)

364-N. (German.) **Diffusion of Ag-Al Alloys.** Th. Neumann and S. Dittrich. *Zeitschrift für Elektrochemie*, v. 61, no. 9, 1957, p. 1138-1146.

Measurements of the diffusion coefficient for Al-rich alloy crystals. 15 ref. (N1a; *Ag*, Al)

365-N. Study of Strain-Hardening and Softening of Iron Alloyed With Manganese. M. D. Perkas. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 8-13. Henry Brutcher, Altadena, Calif., Translation no. 4215.)

Mechanical characteristics of ferrite alloyed with manganese are compared after hardening under various conditions and annealing. Cold working hardened the manganese-alloyed iron more than the unalloyed. Apparently the change in the characteristics of thin structures exposed to cold plastic deformation is one of the basic factors in determining the hardness of ferrite. 9 ref.
(N7e, 2-64, 3-68; Fe, Mn)

366-N.* Structure of Nickel Electrodeposits in Relation to Some Physical Properties. D. J. Evans. *Faraday Society, Transactions*, v. 54, July 1958, p. 1086-1091.

Preferred orientation, internal stress, grain size, hardness, surface topography and brightness; [100] and [1101] were the predominant fiber axes found in matte, semi-bright and bright deposits, and for any given electrolyte [110] was found to be associated with the higher values of internal stress and hardness, while [100] was found to be associated with decreased values. (N12d, Ni, 8-62)

367-N.* Non Equilibrium Beta Retention in Fuel Elements. R. B. Kehce. *United Kingdom Atomic Energy Authority, Technical Note*, IGR-TN/C.855, 1958, 8 p.

Irradiation swelling of U in the beta phase may be less than that at high temperature in the alpha phase owing to the greater strength of the beta phase. During irradiation of U at an alpha temperature, small volumes are raised by the fission heating to the beta phase, and if the induction time for reversion to the alpha phase is sufficiently long a high proportion of the fuel may at any moment be in the beta phase. (N6p, 2-67, T11g; U)

368-N.* The Upper Temperature Limit of Stability of Guinier-Preston Zones in Ternary Aluminum-Zinc-Magnesium Alloys. I. J. Polmear. *Aeronautical Research Laboratories (Australia)*, Metallurgy Note 9, 1958, 8 p.

The metastable boundary for Guinier-Preston (G. P.) zone formation in ternary Al-Zn-Mg alloys appears as a continuous surface on the phase diagram. This suggests that G. P. zone formation is rather similar over a wide range of composition. (N7, J27; Al, *Zn*, *Mg*)

369-N. Field Emission From Mercury Whiskers. Robert Gomer. *Journal of Chemical Physics*, v. 28, Mar. 1958, p. 457-464.

Growth mechanism and constitution of whiskers. (N3r; Hg)

370-N. Some Observations on the Aging of Low Carbon Sheet Steel. E. R. Morgan. *Society of Automotive Engineers, Preprint* 30A, Mar. 1958, 10 p.

Demonstrates that all effects of aging can be eliminated by chemical and mechanical control.
(N7; CN-g, 4-53)

371-N. Studies of the Structure of Steels With High Contents of Carbide Forming Alloying Elements. Angelica Schrader. *Archiv für das Eisenhüttenwesen*, v. 28, Aug. 1957, p. 461-468. (Iron and Steel Institute Translation no. 723.)

Previously abstracted from original. See item 109-N, 1958.
(N8, M22h; AY)

372-N. A Method for the Determination of the Coefficient of Diffusion of Hydrogen in Steels. Paul Bastien and Pierre Amiot. *Revue de Metallurgie*, v. 55, Jan. 1958, p. 24-38. (Iron and Steel Institute Translation no. 981.)

Previously abstracted from original. See item 173-N, 1958. (N1a; ST, *H*)

373-N. (English.) **Surface Melt Patterns on Silicon.** G. L. Pearson and R. G. Treuting. *Acta Crystallographica*, v. 11, June 10, 1958, p. 397-399.

Patterns were formed on Si by heating to within a few degrees of the melting point (1412° C.), followed by a rapid quench. Localized melting occurs where specks of impurities reside on the surface. Straight-sided geometrical patterns several microns in extent are thus formed and their shapes are uniquely determined by the surface crystal plane. 9 ref. (N12n)

374-N. (German.) **Formation of an Anomalous Structure in the Lattice of a Pearlite in Cast Steels.** Karel Rydwal. *Bergakademie*, v. 10, Apr. 1958, p. 235-239.

Phosphorus is the main factor in the origin of the anomalous structure. It increases the A_{e3} temperature, so that in the realm of higher phosphorus content the transformation starts earlier. (N8h; ST, *P*)

375-N. (German.) **Influence of the Rate of Heating on the Austenite Grain Size and the Notch Impact Strength.** Jaroslav Cizek. *Bergakademie*, v. 10, Apr. 1958, p. 239-241.

(N3, Q6n, 2-61; ST)

376-N. (German.) **Cooling Curve of Nodular Cast Iron.** L. Sofroni. *Revue de Métallurgie (Bucarest)*, v. 3, no. 1, 1958, p. 61-79.

The character of the cooling curve of nodular cast iron as a function of the form of the graphite and its chemical composition. Comparison with cooling curves of gray cast iron. 23 ref. (N12; CI-r)

377-N. (German.) **Diffusion and Solubility of Hydrogen in Alpha-Iron and Silver.** Walter Eichenauer, Herbert Künzig and Alfred Pebler. *Zeitschrift für Metallkunde*, v. 49, May 1958, p. 220-225.

New measuring method. (N1a; Fe, Ag, *H*)

378-N. (Japanese.) **Secondary Recrystallization of Aluminum.** Yasuo Ohno. *Meiji University, Faculty of Engineering, Research Reports*, no. 11, 1958, 8 p.

(N5h; Al)

379-N.* (Russian.) **Mechanism of Reaction Diffusion of Systems Cu-Se, Cu-Te, Ag-Se, and Ag-Te.** V. I. Arkharov and V. O. Esin. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 246-250.

It was experimentally established that the concentration gradient of "needle-like" sinters in the systems Cu-Se, Cu-Te, Ag-Se and Ag-Te is very small. The crystalochemical character of the lattice phase forming in the sinter (Cu_2Se, Cu_2Te, Ag_2Se, Ag_2Te) explains the great anisotropy of the speed of diffusion and the needle-like orientation of the crystals. The structural picture of the process of reactive diffusion in the systems under examination is related to the fact that the process is limited by the speed of the reaction at the metal-sinter boundary. 5 ref. (N1e; Cu, Ag, Se, Te)

380-N. (Russian.) **Study of Kinetics of Gradual Transformation of Supercooled Austenite.** B. A. Leontev, L. S. Palatnik and Ya. I. Spektor. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 304-317.

Preliminary transformation of austenite steel in interstitial and martensite regions results in sharp acceleration of interstitial transformation at higher temperatures and considerably reduces speed of pearlite transformation. There is a sharp retardation of interstitial transformation at low temperatures under influence of partial decomposition in upper interstitial regions. A considerable role in kinetics of gradual transformation is played by thin austenite structures which arise during martensitic transformation. 24 ref. (N8h, N8p, 2-61; ST)

381-N. (Russian.) **Effect of Superheating on Properties of Structural Steels.** I. E. Kontorovich and B. M. Voshedchenko. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 340-348.

Character of microstructure as result of preliminary superheating followed by recrystallization within wide temperature intervals. Destruction of old austenitic grain boundaries and their reorientation as result of superheating leads to growth of new grains above the recrystallization temperature. 10 ref. (N5p, N3f, N8, 2-62; ST)

382-N. (Russian.) **Double Annealing of Structural Steel.** L. I. Kogan and

R. I. Entin. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 349-354.

Investigation of phase changes in crystal lattice of residual austenite. Annealing at 500-550° lowers carbon content. Relationship between intensity of secondary annealing and extent of reduction of carbon concentration in residual austenitic steel. (N8m, 2-64; ST, SGB-s)

383-N. (Russian.) **On the Kinetics of Preprecipitation in an Alloy of the Duralumin Type.** Marius Protopopescu. *Revue de Métallurgie (Bucarest)*, v. 3 no. 1, 1958 p. 81-97.

Theoretical and experimental study of the structural changes occurring in an alloy of the duralumin type during hardening. 15 ref. (N7; Al-b)

384-N.* **A Look At "Whiskers".** George A. Hoffman. *Astronautics*, v. 3, Aug. 1958, p. 31-33.

Observation of the properties of whiskers reveal metallic whiskers exhibit a plastic range, while most compounds sustain elastic strains only up to failure. The modulus of elasticity of a whisker may differ radically from the modulus of a large polycrystalline modulus. Creep has not been observed in temperatures below the normal recrystallization temperature, implying considerable strength retention even at temperatures close to the melting point. (N12, M26)

385-N.* **The Influences of Gaseous Elements on the Graphitization and the Microstructure of White Cast Irons.** Masao Ibaraki and Taira Okamoto. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 145-151.

Influence of oxygen and nitrogen which are introduced on red lead (Pb_3O_4) and potassium ferricyanide ($K_3Fe(CN)_6$), respectively, to melt. 6 ref. (N8s; CI-p)

386-N.* **Yield Phenomena in Copper-Arsenic Alloys.** K. Schröder. *Physical Society, Proceedings*, v. 72, July 1, 1958, p. 33-41.

The occurrence of strain aging in single crystals of arsenical copper (0.36% As) has been established by simultaneous determinations of stress-strain curves and changes in electrical resistivity. During yielding the electrical resistance increased more rapidly than normally. The change of resistance during yielding is explained in terms of Cottrell's model of an impurity atmosphere around dislocations. 9 ref. (N7e, P15g Q23b, Q25; Cu, As)

387-N.* **The Study of Diffusion of Carbon in Nickel and Its Alloys Using the Radioactive Isotope C^{14}.** P. L. Gruzin, Yu. A. Polikarpov and G. B. Fedorov. *United Kingdom Atomic Energy Authority, AERE Lib/Trans 783*, 1958, p. 1-10.

Previously abstracted from original. See item 385-N, 1957. (N1a; C, AY)

388-N. **The Isothermal Transformation of Austenite in Carbon Steels.** S. Modin. *Engineers' Digest*, v. 19, May 19-8, p. 188-192. (From *Jernkontorets Annaler*, v. 142, no. 2, 1958, p. 37-80.)

(N8g, N8h, N8m; CN)

389-N.* **A Review of Diffusion in Aluminum.** J. W. H. Clare. *Metallurgia*, v. 57, June 1958, p. 273-278.

Methods of investigation and data on diffusion in Al alloys. Possible sources of error introduced during experimental work. 31 ref. (N1, Al)

390-N. **Recrystallization Diagram of Molybdenum.** E. M. Savitsky, V. V. Baron and K. N. Ivanova. *Academy of Sciences of the USSR, Proceedings*, v. 113, 1957, p. 355-358. (Translation by Consultants Bureau, Inc.)

Relationship of grain size to degree of deformation and annealing temperature. Above 1300° recrystallization was observed in all deformed and annealed samples. Grain growth at the critical degree of deformation occurred from 1400° (10% deformation). An increase in temperature led to still more intense grain growth, maximum grain size being observed at 7.5% deformation for 1530° and at 2.5% deformation for 1730°, while at higher deformations and the same annealing temperature (1530°, 70%) grain size was considerably less. 4 ref. (N5, N3, M27c; Mo)

391-N.* (French.) **Theories on the Formation of Spheroidal Graphite.** M. Ferry. *Metaux - Corrosion - Industries*, v. 33, May 1958, p. 193-211.

Mode of formation of lamellar graphite. Examination of theories on formation and development of spheroidal graphite; indirect formation by decomposition of pre-existing

cementite; direct formation from liquid state; precipitation from solid solution of austenite supersaturated with carbon. 62 ref. (N8q)

392-N.* (Japanese.) **Calcium Treated Cast Iron. Pt. 2. Effect of Calcium-Silicon on the Graphitization of Low-Carbon Iron-Carbon Alloys.** Masuteru Maruyama and Mitsuru Ito. *Japan Foundrymen's Society, Journal*, v. 30, June 1958, p. 479-487.

Graphitization was studied from the point of view of microstructure and the graphitization ratio of castings cast into CO_2 molds. Graphitization temperature of low-carbon Fe-C alloy treated with Ca-Si was considerably lower than that of plain Fe-C alloy, and even in the range of steel compositions, it was between 600 and 800° C., being under the A_1 transformation temperature. Stability of cementite, in the range of low-carbon composition, was remarkably lowered by the effect of calcium. Diffusion of calcium into molten iron progressed with the lowering of carbon content. 11 ref. (N8s; CI, *Ca*, *Si*)

393-N. Effect of Impurities on the Production of Crystallization Nuclei in Supercooled Liquids. D. S. Kamenetskaya. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 33-38.

Crystallization centers form in pure liquids at high degrees of supercooling which are determined by the surface tension at the crystal-liquid interface. The absence of much supercooling in practice is due to active insoluble particles and small amounts of surface-active impurities. The mechanism by which insoluble and soluble impurities act differ: the insoluble act as pre-existing centers; small amounts of soluble impurities materially influence the rate of center formation, which is a consequence of their influence on surface tension and on the activation energy of center formation. 14 ref. (N12n, 3-69)

394-N. Effect of Impurity Diffusion in the Melt on the Distribution in the Crystal During Directed Crystallization. A. I. Landau. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 58-64.

The axial distributions of small impurities in single crystals growing from melts are studied as functions of initial concentration, diffusion coefficient in the melt, rate of crystal growth and equilibrium purification factor. Equations in partial derivatives are derived which describe the impurity distribution in the melt at any time; methods of solution indicated. 7 ref. (N3r; 3-69)

395-N. Thermal and Diffusion Processes in Crystal Growth. G. P. Ivantsov. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 76-85.

The crystal growth rate is determined by the rate of latent heat removal and by the capacity of the substance to crystallize at a definite linear velocity under set conditions (temperature and surface orientation). When the crystal is small and the growth rate very small the system will be isothermal, the effect of uneven temperature distribution will be vanishingly small, and the crystal will adopt a polyhedric shape close to the equilibrium one. If the substance has a high linear crystallization rate and heat removal is rapid a temperature difference will result and "incorrect" growth forms will occur—needles and dendrites. 6 ref. (N12)

396-N. Some Aspects of Crystal Growth in New Phases Arising in Solid Solutions of Metals Observed in the Electron Microscope. N. N. Buinov. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 94-100.

Recrystallization in supersaturated solid solutions inclined to decompose does not occur by new phase nucleation but by the development of submicro regions enriched in alloying component already present in the quenched alloy. The nature of the solid-state crystallization is determined by zone enrichment, followed by enrichment of particles of metastable alloying component phases. The transition from zones to particles of metastable and stable phases occurs allotropically. 18 ref. (N5f, N12p)

397-N. Effects of Modifiers on the Recrystallization of Castings. V. E. Neimark and A. I. Dukhin. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 101-108.

Boron and titanium have different actions on crystal growth in carbonaceous steels: B restricts columnar crystal growth, Ti facilitates the growth of very thin columnar crystals. When the melt crystallizes

in 50-mm. diameter molds B and Ti retard columnar crystal growth in Kh-27 and have no material influence on crystal growth in Kh18N9. Increased heat removal (increased supercooling at the crystalization front) causes the modifiers to have more influence on the nucleation rate in austenitic steel. 10 ref. (N12, ST, *B*, *Ti*)

398-N. Structure and Crystallization Mechanism of Eutectic Alloys. P. S. Vadilo. Paper from "Growth of Crystals". Consultants Bureau, Inc., 1958, p. 109-116.

Zinc-cadmium alloy of eutectic composition consists of large crystals of the main component (up to 1 cm. in size) formed by dendrite growth. The dendrite branches contain small regularly orientated crystals of the second component. The "grain-columns" in a eutectic are dendritic branches of the major component containing normally needle-like inclusions of the second component. 8 ref.
(N12b, N12q; Zn, Cd)

399-N. Study of Processes of Crystallization From Melts. I. N. Fridlyander. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 142-150.

The dendrite branches become finer when cooling rates of Al alloys are increased, the interbranch spaces are reduced, the secondary phase inclusions get finer and are mainly trapped and distributed between the dendrite branches. The strengths of cast alloys increase in step with these structural changes and on heat treatment reach the levels found in forged alloys. Maximum improvement in the properties of the cast metals is effected by continuously pouring a thin layer of liquid metal onto a water-cooled moving grid. 18 ref.
(N12, Q-general; Al-b)

400-N. Formation Mechanism of Graphite Spherules in Cast Iron. I. E. Bolotov, V. I. Syreishchikova and S. G. Guterman. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 163-167.

A necessary condition for graphite to crystallize as spherulites is that the iron be considerably supercooled. Platelet graphite in normal industrial cast irons is due to impurities (sulphur, oxygen), which prevent the iron from being much supercooled since they reduce the graphite-melt interfacial tension and produce (Fe, Mn)S nuclei for the graphite to crystallize on. Modifiers act by purifying the melt from dissolved sulphur and oxygen and destroying (Fe, Mn)S inclusions, so that the supercooling required for spheroidal graphite formation is produced. 15 ref.
(N12, N8q. E25n; CI-r)

401-N. Apparatus and Methods for Growing Single Crystals of Semiconductors. D. A. Petrov and V. S. Zemskov. Paper from "Growth of Crystals". Consultants Bureau, Inc., 1958, p. 207-214.

Germanium, like many other semiconductors, expands considerably on solidifying and is extremely stress-sensitive. Stresses cause twinning and other undesirable structural defects. Stresses inevitably occur on cooling in a crucible, as in Bridgman's method. Chokhralskv's method of growing from the melt is outlined together with a description of the setup. 10 ref.
(N3r, 1-53; Ge, 14-61)

402-N. A Device for Making and Purifying High-Melting Single Crystals by Zone Fusion. V. P. Butuzov and V. V. Dobrovensky. Paper from "Growth of Crystals". Consultants Bureau, Inc., 1958, p. 252-255.

The apparatus was assembled and pumped down to a limiting pressure of 6.10^{-4} mm. Hg. Temperatures up to 2000° C. in the working area could be produced with the graphite heaters. Single crystals of Ni were obtained up to 30 mm. long and diameter about 10 mm. on single-pass zone fusion. 7 ref.
(N3r, 2-53; 14-61)

403-N. The Influences of Superheating and Inoculation on the Graphitization and the Microstructure of a White Cast Iron. Masao Ibaraki and Taira Okamoto. *Institute of Scientific and Industrial Research. Osaka University, Memoirs*, v. 15, 1958, p. 153-157.
(N8s; CI-p)

404-N. On the Carbide Phases in Iron-Carbon-Silicon Alloys. Toshikuni Okumura. *Institute of Scientific and Industrial Research, Osaka University, Memoirs*, v. 15, 1958, p. 159-166.

Study of the formation of silicocarbide during solidification. 6 ref.
(N8r, N12; Fe, *Si*, *C*)

405-N. A User Looks at Cleanliness of Vacuum-Melted Alloys. Donald E. Nulk. *Metal Progress,* v. 74, Aug. 1958, p. 103-109.

The problem of "how clean is clean" is becoming more acute with the development of new superalloys containing increased amounts of reactive elements. Carbides and nonmetallic inclusions interfere with fabrication, influence service conditions and decrease the effectiveness of the alloy from the standpoint of chemical balance. Three methods may be used to measure cleanliness: modified A.S.T.M. inclusion rating, frequency/severity rating and metallographic classification.
(N12, N3, M27, C25; SGA-h, 9-69)

406-N. Some Factors Concerning the Growth of Single Crystals. S. O'Hara. *Royal College of Science and Technology, Metallurgical Club, Journal,* no. 10, 1957-1958, p. 28-30.

Apparatus and procedure for growing Al single crystals from an edge in a graphite mold. Orientations of crystals grown by method were random. 9 ref.
(N3r; Al, 14-61)

407-N.* (French.) **Study of the 'Clear Zones' Phenomena in the Structural Hardening of Ni-Cr and Ni-Cr-Mo Alloys.** C. Buckle and J. Poulignier. *Revue de Metallurgie,* v. 55, May 1958, p. 417-429.

The phenomenon of festoons of 'clear zones' known in light alloys as the 'light phenomenon' can be obtained in industrial Ni-Cr and Ni-Cr-Mo alloys by varying rate of cooling after solution heat treatment. If cooling is sufficiently rapid, the phenomenon appears during aging treatment. Its evolution as a function of temperature and time can be followed by micro-examination. Observation on specimens that have undergone creep helps show the manner in which zones participate in plastic deformation of the whole. 6 ref. (N7, 3-68; Cr, Ni, Mo)

408-N.* (French.) **Radiocrystallographic Investigation of Tempered Martensite Carbides Prepared by Quenching Pure Iron-Carbon Steels.** F. Marion and R. Faivre. *Revue de Metallurgie,* v. 55, May 1958, p. 459-469.

Tempered martensite carbides (isolated by electrolytic method) may be considered as a continuous series of nonstoichiometric compounds which approach cementite when the temperature rises or when the duration of isothermal heating is prolonged. Structure is derived from that of cementite by subtraction of carbon atoms. This is represented by a formula. 24 ref.
(N8p, 2-64; CN)

409-N. (Russian.) **The Ordering Process in Iron-Cobalt Alloys.** G. N. Kaduikova and Ya. P. Selisskii. *Fizika Metallov i Metallovedeniia,* no. 3, 1956, p. 486-496.

Specimens of alloys containing 25.24-49.51% Co and 74.46-48.5% Fe were cold rolled to 82% reduction and annealed at 180-800° for periods from 1 min. to 2 hr. Degree of ordering was determined by measuring electrical resistance and hardness at room temperature. The presence of alloying elements did not play any important part in increasing hardness. The hardening phenomenon is explained by the ordering process which takes place in the distorted lattice of the cold worked metal and which gives rise to additional stresses. It is suggested that a prerequisite of hardening must be a combination of the initial stages of ordering and of recovery when the relief of residual stresses is taking place slowly. (N10; Fe, Co)

410-N. (Russian.) **Diffusion of Indium, Antimony and Tellurium in Indium Antimonide.** B. I. Boltaks and G. S. Kulikov. *Zhurnal Tekhnicheskoi Fiziki,* no. 1, 1957, p. 82-84.

Diffusion coefficients (D) of In, Sb and Te were measured in coarse-grained InSb ingots using the radioactive In^{114}, Sb^{124} and Te^{127} isotopes by the successive layer removal technique. At one and the same temperature, D falls in the order In, Te and Sb. Extrapolation of the data to high temperatures indicates that near the melting point of InSb, all the D coincide. Differences in the activation energies for diffusion of In, Te and Sb in InSb are related to the mechanism of the effect of these elements on the electrical properties of semiconductors (of the hole type). The introduction of Te influences the electronic nature of the conductivity. (N1e, In, Sb, Te)

411-N. Effect of Low-Frequency Vibrations in the Mold on Ingot Crystallization. V. I. Leontyev. Paper from Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 28-31. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Fine granulation of the ingot structure may take place both as a result of the mixing of the molten mass and the effect of considerable variable strains, acting on the growing crystal from the direction of the mold. In the first case dependence on the velocity of oscillations is manifested, in the second, dependence on acceleration. A nonporous ingot may be obtained if the velocity of the oscillations does not exceed that at which ejection of molten mass drop occurs. To obtain optimal results the ingot (artificially or naturally) should break away from the mold and receive impact at its bottom. 4 ref. (N12; 5-59)

412-N. Form Dependence of Crystal Growth on Speed of Growth. V. I. Malkin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958. p. 60-65. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Investigation of the crystallization of Pb ingots under conditions of one-sided thermal withdrawal resulted in immediate changes in the speed of growth; comparison with the structure obtained showed that Pb has a speed of growth above which a columnar structure appears in the development of crystals. With speeds of growth less than 0.1 mm. per min. columnar crystals are not formed. 5 ref. (N12, 3-67; Pb)

413-N. Microstructural Investigation of Martensitic Transformation. O. P. Maksimova and A. I. Nikonorova. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 69-100. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Purpose of investigation was to study the features of the structural forms of martensite produced under varying conditions: upon cooling; in the process of plastic deformation; as a result of cooling of previously deformed austenite. New data on phase hardening occurring in austenite in the course of direct and reversed martensitic transformation. 8 ref. (N8p, 3-68)

414-N. Effect of Deformation on the Speed of the Isothermal Martensitic Transformation in Iron-Nickel-Manganese Alloy. O. P. Maksimova, A. I. Nimonorova and G. K. Pogorelov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 101-113. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Influence of preliminary plastic deformation on kinetics of the isothermal martensitic transformation in an iron alloy containing 22.7% Ni and 3.1% Mn and giving a considerable transformation effect upon deep cooling. The martensitic point, detected upon continuous cooling at a rate of 10° C. per min. is −10°. 14 ref. (N8p, 3-68; Fe, Ni, Mn)

415-N. Phenomenon of Stabilization in Reverse Martensitic Transformation. Ya. M. Golovchiner and Yu. D. Tyapkin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 141-147. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Metals investigated were two Fe-Ni alloys, 27% Ni and 27% Ni, 1.5% Ti, which experience the reverse martensitic transformation alpha→gamma when heated to suitable temperatures. Phase composition of the specimen after heat treatment was determined by X-ray diffraction. The magnetometric method was used to study the general course of the gamma→alpha transformation and determine the martensitic point. 8 ref. (N8p; Fe, Ni)

416-N. On the Processes of Carbide Formation in Isothermal Decomposition of Alloyed Austenite. R. I. Entin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 156-164. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

In the pearlite temperature range even the early stages of austenite decomposition result in formation of special carbides and cementite, with a content of alloying elements that is considerably greater than their average content in the steel. The diffusion redistribution of the alloying elements is a necessary component part of the austenite decomposition. The reduced diffusion speed of these elements compared with the diffusion speed of carbon determines in many cases the slowdown of the austenite decomposition processes. 19 ref. (N8, N1e, 2-60; ST)

417-N. Investigation of the Distribution of Chromium and Tungsten

During the Decomposition of Austenite Using the Radioactive Tracer Method. S. V. Tsivinsky, L. I. Kogan and R. I. Entin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 185-199. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Decomposition of alloyed austenite in the pearlite range of temperatures is caused by the need of diffusion redistribution of the alloying carbide-forming elements (Cr or W) in the austenite. During isothermal decomposition of austenite the relative content of the alloying carbide-forming elements in the carbide phase varies relatively little. The influence of secondary diffusion redistribution of the alloying elements among the decomposition products appears only after the termination of the austenite decomposition. (N8, M23q)

418-N. On the Nature of the Hardness of Tempered Steel. G. V. Kurdyumov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 221-231. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

The high resistance of hardened steel to plastic deformation is determined by the formation of a special micro and submicrostructure, and by the high elastic limits of the martensite crystals in the hardened steel. The basic role of carbon in resistance to deformation lies in the change of the properties of the crystals of the alpha phase, owing to the penetration of the carbon atoms into the alpha-iron lattice. 28 ref. (N8a; ST, 3-68)

419-N. Effect of Austenite Decomposition Upon Rate of Diffusion of Hydrogen in Steel. R. A. Ryabov and P. V. Gel'd. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 189-190. (Henry Brutcher, Altadena, Calif., Translation no. 4257.)

Anomalies in graphs of hydrogen diffusion rates against temperature in temperature ranges in which decomposition of austenite accelerates. Measurements of diffusion rates of hydrogen through membranes. Factors governing rate of removal of hydrogen from Ni-Cr steels and their significance in connection with hydrogen embrittlement.
(N1, N8, D11h, Q26s; AY, *Cr, Ni*)

420-N. (Russian.) **Structure of Alloys of Iron With Vanadium and Chromium.** M. I. Zakharova. *Doklady Akademii Nauk SSSR,* v. 119, no. 3, 1958, p. 498-500.

X-ray and metallographic studies of structure of Fe-V and Fe-Cr alloys after heating to various temperatures between 600 and 1400° C., followed by quenching into water. Evidence of formation of beta phase (in addition to alpha and sigma phases) having a face-centered cubic structure. (N6p, Fe, *Cr, V*)

421-N. Changes in the Fine Structure of Austenite and of the Kinetics of the Martensitic Transformation Under the Influence of Plastic Deformation. O. P. Maksimova, A. I. Nikonorova and E. I. Estrin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 114-122. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Plastic deformation of Fe alloy with 22.4% Ni, 3.4% Mn leads to sharp increase in stability of the austenite with respect to the martensitic transformation upon cooling. Relatively small deformations, not enough to cause formation of martensite crystals during the reduction process, are already capable in practice of fully preventing the transformation of austenite upon subsequent deep cooling. The increased austenite stability caused by deformation is accompanied by a change in the fine structure of the austenite. 11 ref.
(N8p, 3-68; Fe, *Ni, Mn*)

422-N. Effect of Cooling Conditions on the Kinetics of the Martensite Transformation. O. P. Maksimova and E. G. Ponyatovsky. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 123-133. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Investigation using thermomagnetic method on Fe-Ni-Mn alloy (22.4% Ni; 3.4% Mn; 0.04% C), having a martensitic point of −30. Presupercooling of the austenite contributes to a more intense course of the martensitic transformation, increasing the initial speed of the isothermal transformation of austenite over the entire martensitic range of temperatures. Increase in speed of martensitic transformation becomes more pronounced with increasing degree and speed of pre-supercooling. 15 ref. (N8p; Fe, *Ni, Mn*)

423-N. On the Effect of Hot Plastic Deformation on the Kinetics of the Martensitic Transformation in High-Nickel Steels. O. P. Maksimova, A. I. Nikonorova and G. K. Pogorelov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 134-137. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

High plastic deformation has a substantial effect ending at relatively low temperature (on the order of 700-800°) on the stability of austenite with respect to subsequent deep cooling (on the position of the martensitic point and on the intensity of transformation) in steels containing from 22 to 24% Ni.
(N8p; AY, *Ni,* 3-68)

424-N. Determination of Binding Energy in Austenite Lattices. Yu. V. Kornev. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 312-316. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Since there is a definite relationship between the self-diffusion activation energy and the binding energy in the lattice, the conclusion was drawn that introducing the carbon into the iron reduces the binding energy in the austenite lattice. Data confirm the deduction that the self-diffusion activation energy can serve as a measure of the binding forces in crystalline lattices of pure metals, and permit extending this deduction to interstitial solid solutions. 8 ref. (N8f, N1d; Fe, C)

425-N. Influence of Carbon on the Binding Forces and on the Static Distortions in Martensite Crystals. G. V. Kurdyumov, V. K. Kritskaya and N. M. Nodia. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission.* AEC-tr-2924, 1958, p. 317-321. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Elastic limit of the martensite lattice is several times greater than the elastic limit of the alpha iron lattice. The cause is apparently the large static distortion of the martensite lattice caused by the presence of carbon atoms dissolved in the lattice. 8 ref.
(N8p, N10a, Q21e; ST, *C*)

426-N.* (German.) **Transformation Phenomena Occurring in Patenting Rope Wires After Electric Resistance Heating in Relation to the Mechanical Properties.** Adolf Rose, Leo Rademacher and Karl Schemmer. *Stahl und Eisen,* v. 78, July 10, 1958, p. 966-974.

Austenitization of prepatented and predrawn rope wire containing 0.4 to 0.8% C creates adequate austenite structures when temperature is from 100 to 150° above ferrite dissolution point. Coarser structures may require higher temperatures. Raising temperature, once austenitization is accomplished, has no influence on mechanical properties. Dilatometric examination of isothermal austenite disintegration indicates that presence of carbon accelerates austenite decomposition before, during and after lead-bath. Isothermal experiments do not alter mechanical properties. Changes in direct, indirect resistance heating or operating conditions during patenting have no significant influence on ultimate stress values of wires. 5 ref.
(N8f, J25, 2-64; ST, 4-61)

427-N. (Russian.) **Fine Crystalline Structure of Some Nickel Alloys.** V. G. Chernyy. *Ukrains'kii Fizichnii Zhurnal,* no. 2, 1957, p. 73-75.

Distortions of crystalline lattice and the dimensions of block mosaic (regions of coherent diffusion) in alloys of the Nichrome type (about 20% Cr and 80% Ni, with up to 1.24% Ti and 2% Al) were determined. Alloys were plastically deformed (up to 80%) and subsequently annealed at 400 to 800°. Alloying with Al and Ti increases hardness after plastic deformation and promotes high-temperature strength. The result is explained by a strengthening of interatomic bonds in the crystalline lattice by introduction of Al and Ti into the solution.
(N1e, N10a, Q24, 2-60; Ni, Cr, Ti, Al)

428-N. The Concentration of Hydrogen in Nickel Under Hydrogen Ion Bombardment. J. Morrison and J. J. Lander. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 145-148.

Observation showed no increase in dissolved hydrogen when clean Ni was bombarded. Considerable increases were obtained at 200° C. when Ni was coated with nickel or barium oxide. Energetic ions penetrate the outer surfaces of the coated materials and are trapped in the interior by surface barriers. This shows that normal values of

concentration cannot be applied to Ni if its surfaces are contaminated. 4 ref. (N15e; Ni, *H*)

429-N. On the Nature of the Change of the Coercive Force Upon Annealing of Hardened Low-Carbon Steel. I. A. Bildzyukevich, Ya. M. Golovchine and G. V. Kurdyumov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 138-140. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Factors playing a substantial role in the strong increase in coercive force are the martensitic transformation proper, which causes the formation of characteristic, inhomogeneous micro and submicrostructures and stresses; properties of the martensite crystals themselves, namely the fact that the martensite is a supersaturated solid solution of carbon in alpha iron; a certain heterogeneity of the hardened steel owing to the presence of a certain amount of residual austenite and a partial decomposition of the martensite. 14 ref. (N8p, 2-64; CN-g)

430-N. On the Diffusion of Cobalt, Chromium and Tungsten in Iron and Steel. P. L. Gruzin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 329-336. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Investigation of the temperature dependence of the diffusion coefficients of Co, Cr and W in the alpha and gamma phases of iron and in carbon steel of eutectic composition. Diffusion coefficients in austenite for all the elements studied differ only slightly. In ferrite at 800-900°, Cr diffuses most slowly and Co most rapidly. W occupies an intermediate position closer to Cr. The diffusion coefficients in steel are almost the same in magnitude for the whole range of temperatures studied. 12 ref.
(N1c; Fe, Cn-b, *Co, Cr, W*)

431-N. On the Problem of Studying Diffusion by the Method of Radioactive Isotopes. P. L. Gruzin and D. F. Litvin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 337-342. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Isotopes of a great number of elements emit simultaneously both beta and gamma rays. If one deposits such an isotope upon the specimen and subjects the latter to a diffusion anneal, then the relation of the measured intensity of the beta radiation of the specimen to that of the gamma radiation will be decreased. Since the ratio of the intensities of the beta and gamma rays are changed conclusions can be drawn about the diffusion in the specimen and a diffusion coefficient determined.
(N1a, 1-59, 14-62)

432-N. Influence of Inter-Grain Structure of Austenite on the Self-Diffusion of Iron. P. L. Gruzin, E. V. Kuznetsov and G. V. Kurdyumov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 343-345. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

The role of changes of intra-grain structure in affecting the speed of diffusion can be shown in alloys in which the transition of austenite into martensite occurs only at temperatures lower than room temperature. Materials used for study were two Fe-Ni-C alloys, one containing 19.8% Ni and 0.45% C, the other 24.6% Ni and 0.69% C. 8 ref.
(N1d, N8p; Fe, Ni, C)

433-N. Influence of Carbon on the Self-Diffusion of Iron in the System Iron-Nickel. P. L. Gruzin and E. V. Kuznetsov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 346-349. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Magnitude of the diffusion coefficients was determined in the temperature range 800-1300° for alloys with 20% Ni and in the range 1000-1330° for alloys with 25% Ni. Carbon weakens the binding forces of the atom not only in gamma iron, but also in the solid solution of a binary Fe-Ni alloy. Influence of carbon on the parameters of self-diffusion in binary alloys decreases with increase of the Ni content. 4 ref. (N1d; Fe, Ni, *C*)

434-N. Influence of Manganese on the Self-Diffusion of Iron. P. L. Gruzin, B. M. Noskov and V. I. Shirokov. Paper from "Problems of Metallography and the Physics of

Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 350-354. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Investigation of the temperature dependence of the self-diffusion coefficient of Fe in the gamma phase of Fe-Mn alloys, by the method of radioactive indicators, using the artificially radioactive isotope Fe^{59}. Both for volume self-diffusion and for self-diffusion between crystallites an increase of the concentration of Mn in the alloy up to 4% leads to an increase in the activation energy and the factor before the exponential. 6 ref. (N1d, Fe, *Mn*)

435-N. Influence of Alloying on the Self-Diffusion of Cobalt. P. L. Gruzin and B. M. Noskov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 355-360. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Alloying Co with up to 7% Cr leads to an increase of the activation energy of self-diffusion, and increases the interatomic binding in the crystal lattice of the alloy. Alloying with up to 4% Ni increases the activation energy of self-diffusion. Thus, even small concentrations of a second or third component can bring about appreciable changes in the binding forces in alloy lattices. 22 ref.
(N1d, M25h, 2-60; Co, *Cr, Ni*)

436-N. Influence of Chromium on the Self-Diffusion of Iron. P. L. Gruzin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 362-364. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Chromium appreciably strengthens the interatomic binding forces in the lattice of gamma Fe and reduces the mobility of the Fe atoms in the range of temperatures below 1100°. It is supposed that carbon weakens the interatomic forces in austenite not only in ordinary steel but also in steel alloyed with chromium. 4 ref.
(N1d, M25h, 2-60; Fe, *Cr*)

437-N.* (Czech.) **Contribution to the Determination of Stability of Kovar Alloys.** Alexander Spirkov. *Hutnicke Listy*, v. 13, 1958, p. 509-512.

Stability determined as function of the square of the characteristic temperature by means of differential thermal analysis. The higher its characteristic temperature, the more stable the Kovar alloy. Kovar alloys containing both alpha and gamma phases show only a mean characteristic temperature; the value of the distortion factor is identical for both phases. Alloys with high characteristic temperature are less susceptible to the gamma-to-alpha transformation than those with lower characteristic temperatures. 5 ref. (N6p, P11; Fe, Ni, Co)

438-N.* (French.) **Study of Cementites With Manganese Substitutions.** Paul Lesage-Bourdon and Andre Michel. *Comptes Rendus*, v. 246, May 5, 1958, p. 2624-2627.

Synthetically prepared samples of ferromanganese containing about 5% Mn were carburized in mixture of CO plus H at 700° C., yielding a Mn-poor alpha phase and a richer gamma phase which become carburized separately and have different Curie points. Homogenization of Mn content is not possible at 700° C., because diffusion is too slow. An anneal at 950° C. provokes decomposition of Mn-poor cementite; stabilized Mn-rich cementite resists this treatment. Specimens stabilized by diffusion of carbon in ferromanganese, heated to 950° C., provided series of homogeneous solid solutions of Mn in cementite. Studies confirmed that Mn largely replaces iron of cementite and exerts powerful stabilizing influence in presence of this carbide. 10 ref.
(N8, 2-64; AD-n, Mn, Fe)

439-N.* (Japanese.) **Ferrite Grain Size and Hardness of Electric Resistance Welded Pipe After Cold Working and Annealing.** Takayoshi Yamamoto. *Sumitomo Metals*, v. 10, Jan. 1958, p. 5-8.

Investigation on mild steel pipe with varying carbon content. Recrystallization occurred at annealing temperature of 600 to 700° C. Tendency for gain growth almost parallel to carbon content. Grain growth greater when cold reduction is about 10%. Both weld and base metal have similar tendency for recrystallization. Grain size is reduced with greater cold working. 16 tables.
(N3, Q29n, 2-64, 3-68; CN, 4-60, 7-51)

440-N.* (Japanese.) **Investigation of NKS-Magnet. Pt. 1.** Toshihiko

Tsunowo and Akira Higuchi. *Sumitomo Metals,* v. 10, Jan. 1958, p. 31-36.

Aging, microscopy, differential thermal dilatation, magnetic analysis and X-ray analysis utilized to investigate samples of alloys of 8 Al, 14 Ni, 24 Co, 3 Cu type. Permanent magnetism did not depend upon simple precipitation of alpha prime or gamma phase but upon nucleation and growth of a certain kind of precipitate. High-temperature X-ray analysis indicates that precipitation had irreversible gamma-to-alpha transformation resembling the FeNi binary system. 10 ref.
(N7b; P16q, X11g, SGA-n)

441-N. (Russian.) **Ordering Mechanism in the Alloy Ni_3Mn With Various Additions of Molybdenum.** B. G. Livshits, B. V. Molotilov, N. N. Myuller and N. A. Savost'yanova. *Fizika Metallov i Metallovedenie,* no. 3, 1956, p. 477-482.

Study of alloys containing 74-75% Ni, 21-23% Mn and 0.64-4 10% Mo, quenched after heating to 1000° to bring them into the disordered state and then annealed at 250-550° for prolonged periods. Electrical resistance investigated; thermomagnetic properties determined by the Akulov anisometer; X-ray analyses. Measurements of normal modulus of elasticity by the resonance method. Data from thermomagnetic measurements show that ordering of the alloy takes place in a heterogeneous manner. The introduction of Mo raises the electrical resistance, and lowers the magnetic saturation; however, these effects are more complicated than merely a concentration disordering.
(N10b, 2-60; Ni, Mn, Mo)

442-N.* (German.) **Kinematics of the Growth of Tin Crystals.** Elias Anastasiadis. *Freiberger Forschungshefte,* no. B-21, 1958, p. 11-91.

Experiments with aqueous solutions of $SnCl_2 \cdot 2H_2O$, with and without additions of HCl. Growth of Sn crystals as they develop in an electrolytic solution was recorded by micro-motion-picture equipment and the influence of different concentrations studied. These crystals formed from solution differ very little from crystals grown in a vapor phase, other solutions or in a melt. (N12e; Sn)

443-N.* (Russian.) **Investigation of Effect of Molybdenum, Chromium and Columbium on Properties of Invar Alloys.** A. Z. Ivanuskina and B. G. Livshits. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 527-535.

Using a dilatometer and electroresistivity tests it was shown that introduction of Mo into permalloy consisting of Ni_3Fe has a negative effect on the ordering of the alloy; however, by increasing Mo above 1%, changes take place in the opposite direction. Thus, there is an increase in electrical resistivity of alloys Ni_3Fe + 2-6% Mo after prolonged low-temperature annealing. 7 ref.
(N10b, P15g, 2-60; Fe, Ni, Cb, Cr, Co)

444-N. Kinetics of Isothermal Conversion of Austenitic Carbon Steel on Induction Heating. I. N. Kidin and Yu. A. Bashnin. *Metallovedenie i Obrabotka Metallov,* v. 4, July 1958, p. 10-15. (Henry Brutcher, Altadena, Calif., Translation no. 4275.)

Austenitic steel shows less stability after induction heating than after heating by usual methods, due to the nonuniformity of carbon and the reduction in size of austenite grains. The decisive factor determining the character of austenitic steel during induction heating is the austenitization procedure—the speed of heating in the region of phase transformations. 9 ref.
(N8g, M27c, J22, J2g, 2-64; CN)

445-N* **Floating Crucible Technique for Growing Uniformly Doped Crystals.** W. F. Leverton. *Journal of Applied Physics,* v. 29, Aug. 1958, p. 1241-1244.

This method, a simple modification of the Czochralski technique, permits the growing of large Ge single crystals of uniform resistivity. (N3r, P15g; Ge, 14-61)

446-N. Variation of the Kinetics of Weakening With the Composition of the Strengthening Phase During Dispersional Hardening. G. V. Kurdyumov, R. I. Entin and V. M. Rozenberg. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 246-256. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

The weakening of steels and alloys is in many cases related to the coagulation of particles of the strengthening phase. Coagulation of the carbide phase during annealing of quenched steel, or dispersional hardening of alloys, leads to a considerable decrease of strength. One of the methods of increasing

the resistance of alloys to weakening at high temperatures consists in delaying the coagulation processes of the strengthening phase by alloying with other elements. Effect of additions of W, Co, and Cb. 4 ref. (N7, Q27c, 2-63, 2-64; ST, Cb, Co, W, AD-n)

447-N. Effect of Sudden Deformation on the Formation of Martensite Lamellae. A. Másin and D. Tlusta. *Ceskoslovensky Casopis pro Fysiku,* no. 2, 1956, p. 225-226. (Henry Brutcher, Altadena, Calif., Translation no. 4275.)

Test pieces of Fe containing 5% Mn and 1% C., oil quenched from 1100° C., with a 1.5-mm. notch, were impact tested on a Charpy machine. The fracture surface and surrounding areas were examined under the microscope. Fine martensite lamellae formed near the fracture surface and were distributed in three ways within the austenite grain; linearly, with martensite needles crossing each other at an angle of 60°; in a mutually perpendicular arrangement; and with martensite precipitated between the differently oriented parts of the mosaic grain. (N8p, 3-68; AY)

448-N. (Latvian.) **Effect of Chemical Composition on Some Details of Martensitic Transformations.** E. L. Vinogradskaya and G. A. Kreslina. *Izvestiya Akademii Nauk Latviiskoi S.S.R.,* no. 2, 1957, p. 153-160.

Alloys of composition C 0.06%, Mn 13.12, Cu 0.28, Co 2.12, remainder Fe, and C 0.12%, Mn 12.93, Cu 1.61, remainder Fe, were studied by the magnetometric method. Specimens were heat treated by soaking at 900° C. and quenching at the rate of 5° C. per min. to −194° C. A complete hysteresis loop was obtained for the reversible martensitic gamma-to-alpha transformation. Increase of C and Cu lowers the Ms point and reduces the amount of alpha-phase obtained when martensitic transformation is complete. Degree of hysteresis of the reversible martensitic transformation is mainly determined by Ms temperature. (N8p; AY, *Mn*)

449-N. (Russian.) **Process of Carbide Formation During the Tempering of Carbon Steel.** B. A. Apàev. *Metallovedenie i Obrabotka Metallov,* no. 1, 1957, p. 2-15.

Study by thermomagnetic method, using "intensity of magnetization versus temperature" curves, of the transformation characteristics during tempering of steels 40, U8 and U12. Phase constitutions of steels of different C contents differ sharply from each other after tempering under identical conditions. The reason for this is the presence of an intermediate χ Fe_5C in medium and high-carbon steels which is absent in low-carbon steels. 55 ref. (N8a; CN)

450-N. (Russian.) **Self-Diffusion of Iron Within Grains and Along Grain Boundaries.** S. Z. Bokshtein, S. T. Kishkin and L. M. Moroz. *Metallovedenie i Obrabotka Metallov,* no. 2, 1957, p. 2-10.

Coefficients of self-diffusion determined by the autoradiographic method, using the Fe^{59} isotope. The investigation was carried out on alpha-Fe at 800° and on gamma-Fe at 1000, 1100 and 1200°. (N1d; Fe)

451-N. (Russian.) **Effect of Heating Rate on Completeness of Recrystallization of Previously Quenched Steel.** B. G. Sazonov and A. S. Zlatkina. *Trudnovoi Institut Fizicheskoi Metallurgii Ural Filial Akademii Nauk SSSR,* no. 17, 1956, p. 20-40.

Effect of heating rate up to 1000° C. per sec. The degree of orientational relationship between the newly forming austenite and the original structure, on heating a quenched steel, determines the degree of development of secondary grain texture and consequently the completeness of recrystallization when the steel is heated. The magnitude of the effect depends essentially on the heating rate. (N5, M27c, 2-61; ST)

452-N. (Russian.) **Effect of Prior Overheating of Steel on the Decomposition Kinetics of Supercooled Austenite.** V. D. Sadovskii. *Trudnovoi Institut Fizicheskoi Metallurgii Ural Filial Akademii Nauk SSSR,* no. 17, 1956, p. 41-66.

Decomposition kinetics in steel 37KhNZA, 40KhSA and 30KhGSA, after factory annealing (as supplied), quenching from the normal temperature and quenching from 1300° C. followed by high-temperature tempering. Prior quenching from high temperatures leads to the nucleation of pearlite-troostite colonies (after subsequent heating to temperatures in the interval between Ac_3 and the c point of Cher-

nov) in the boundaries of the original grains of the overheated metal. This leads to retardation of the transformation process, increasing with increasing original grain size. (N8, 2-64; AY)

453-N. (Russian.) **Effect of Small Concentrations of Alloying Elements on the Self-Diffusion of Iron.** V. V. Sanadza and T. A. Tsivtsigadze. *Trudy Gruzinskogo Politekhnicheskogo Instituta,* no. 1, 1956, p. 141-144.

Effect of small additions of vanadium studied by radioisotope Fe^{59} electrolytically deposited on the specimens. Diffusion annealing was carried out in vacuo at 1050, 1100 and 1150°, and the coefficient of diffusion was determined by removing layers and subsequently measuring the total activity. Activation energies of diffusion of Fe for alloys containing 0.1, 0.25 and 0.4% V were 62, 54 and 40 kcal. per g-atom, respectively. Alloying Fe with even small amounts of V leads to a reduction in the activation energy of diffusion and consequently weakens the binding forces in the crystal lattice of the alloy. (N1d, 2-60, M25h; Fe, *V*)

454-N. (Russian.) **Diffusion of Indium, Antimony and Tellurium in Indium Antimonide.** B. I. Boltaks and G. S. Kulikov. *Zhurnal Tekhnicheskoi Fiziki,* no. 1, 1957, p. 82-84.

The diffusion coefficients of In, Sb and Te in coarse-grained InSb ingots were measured using the radioactive In^{114}, Sb^{124} and Te^{127} isotopes by the successive layer removal technique. At one and the same temperature, diffusion falls in the order In, Te and Sb. Extrapolation of the data obtained to high temperatures indicates that near the melting point of InSb, all the coefficients coincide. Differences in the activation energies for diffusion of In, Te and Sb in InSb are related to the mechanism of the effect of these elements on the electrical properties of semiconductors (of the hole type). The introduction of Te influences the electronic nature of the conductivity. (N1e, P15g; In, Sb, Te)

455-N. (Ukrainian.) **Transformation in Heat Resisting Alloy No. 1 of the Fe-Cr-Al System.** P. P. Kuz'menko. *Naukovi Zapiski Kievskogo Instituta,* no. 5, 1956, p. 135-139.

When an alloy containing Fe 75.34%, Cr 18.35, Al 5.8, C 0.04, Mn 0.18 and Si 0.29, is annealed for long periods at 1200° C. in sealed capsules, its properties alter considerably. After annealing 228 hr. the lattice dimension is reduced from 2.8808 to 2.8660Å, density increased by 5%, microhardness increased by about 3.5 times and brittleness sharply increased. During annealing a new phase is precipitated in the form of hard inclusions. After 228 hr. alpha-to-gamma transformation occurs. It is concluded that as normally made the alloy is not in equilibrium, that equilibrium is reached very slowly and that it is accompanied by decomposition of the single-phase solid solution. (N8; SGA-h)

456-N. Microscopic Study of Transformations in Metal-Powder Compacts Being Heated. Ya. G. Davidovich and K. V. Kononova. *Zavodskaya Laboratoriya,* v. 24, no. 1, 1958, p. 62-63. (Henry Brutcher, Altadena, Calif., Translation no. 4295.)

Previously abstracted from original. See item 202-N, 1958. (N6; 2-62, 6-70)

457-N. (Hungarian.) **TTT-Curves of Standard Steels.** Istvan Mester. *Kohaszati Lapok,* v. 91, Apr. 1958, p. 168-173.

8 ref. (N8; ST)

458-N. (Russian.) **New Types of Solid Solutions in High-Titanium Slags.** A. V. Rudneva, M. S. Model and T. Ya. Malysheva. *Academy of Sciences of the USSR, Proceedings,* v. 115-117, 1957, p. 27-31.

New series of solid solutions of unlimited miscibility have been discovered and studied: (1) $2MgO \cdot TiO_2$ — $2FeO \cdot TiO_2$ and (2) (Fe, Mg, Mn) $O \cdot TiO_2$ — Ti_2O_3. In addition to the known solid solutions having the Ti_2O_3 (anosovite) structure, the two newly discovered solid solutions also play a very important part in the phase composition of high-titanium slags. 7 ref. (N12p; Ti, RM-q)

459-N. (Russian.) **On Dissolving Graphite in Austenite.** K. P. Bunin and A. A. Baranov. *Metallovedenie i Obrabotka Metallov,* v. 4, July 1958, p. 15-18. (Henry Brutcher, Altadena, Calif., Translation no. 4276.)

Investigation discloses that filling the vacancies formed in austenite during dissolution of graphite has a self-diffusing character. 15 ref. (N1d; ST)

460-N. Growth of Preferentially Oriented Aluminum Single Crystals. Theodore H. Orem. *National Bureau of Standards, Journal of Research,* v. 60, June 1958, p. 547-549.

Method permits growth of crystals having both preferred orientation and any desired cross section. (N3r, M26c; Al, 14-61)

461-N. (Russian.) **Study of the Formation of Crystals of Martensitic Phases by the Microcinematographic Method.** A. L. Belinkii. *Doklady Akademii Nauk SSSR,* no. 4, 1956, p. 556-558.

Formation and rate of growth of martensitic beta-phase crystals in Cu-Sn bronzes containing 24.6-24.8% Sn and of martensite crystals in steel 50N20G2 and also of the effect of prior plastic deformation in the linear growth rate of martensite crystals. Increase in the degree of prior plastic deformation reduces the rate of growth of crystals and makes them adopt a zig-zag, interrupted form. When the temperature is reduced, the growth rate of beta-phase crystals is lowered, which demonstrates the thermal nature of the martensitic transformation.
(N6q, N8p, 3-68; Cu-n; ST)

462-N. (Russian.) **Investigation of the Mechanism of Aging of High-Coercivity Iron-Nickel-Aluminum Alloy.** B. G. Livshits and V. S. L'vov. *Fizika Metallov i Metallovedeniye,* no. 3, 1955, p. 455-458.

Alloy of 27% Ni, 15% Al, remainder Fe, investigated. Coercivity and temperature coefficient of electric resistivity measured at various stages of heat treatment. Supercooled solid solution of Fe, Ni and Al alloy breaks up at 800-850° C. into an Fe phase and a Ni-Al phase. At a lower temperature (700° C.) there is a further decomposition of the Ni-Al phase.
(N7a, P16; Fe, Ni, Al)

463-N. (Russian.) **Study of Phase Composition and Phase Homogeneity Limits of Vanadium-Carbon-Oxygen System. Pt. 1. Vanadium-Carbon System.** M. A. Gurevich and B. F. Ormont. *Zhurnal Neorganicheskoi Khimii,* no. 2, 1957, p. 356-366.

At high temperatures, the alloys are ternary solid solutions of ferrite subject to transformation under annealing or slow cooling; the temperature of the transformation rises continually from 868° C. for FeCr to 1225° C. for FeV.
(N6p, M24c; V, C, O)

464-N. (Russian.) **Transitions in Solid State in Copper-Zinc System in Range of Apha Solid Solution.** A. T. Grigor'yev, Yu. M. Sokol'ovskaya and V. N. Pyatnitskiy. *Zhurnal Neorganicheskoi Khimii,* no. 7, 1957, p. 1547-1551.

Phase transitions are accompanied by formation of the chemical compound CuZn which has a low-temperature modification alpha$_1$ (transition at 233° C.) and a high-temperature modification alpha$_2$ (transition at 452° C).
(N6p; Cu, Zn)

465-N. Recovery of Embrittled Cadmium Plated Steel. H. H. Johnson, E. J. Schneider and A. R. Troiano. Case Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131654, Dec. 1957, 22 p. $.75.

The baking process used to mitigate hydrogen embrittlement during Cd electroplating of steel is not always effective. Influence of Cd electroplate upon the recovery characteristics of hydrogen embrittled steel indicates that the Cd plate strongly deters hydrogen outgassing upon baking and thus delays recovery. This recovery rate decreases as the plate thickness increases.
(N4, Q26s; ST, *Cd,* 8-12)

466-N. (Russian.) **Intercrystalline and Volume Diffusion of Manganese Into Iron.** D. S. Kazarnovskiy. *Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk,* no. 7, 1956, p. 94-102.

A study was made of the frontal diffusion at 1100-1200° C. of Mn into Fe. The diffusion of Mn into ordinary Fe proceeds along a straight front, parallel to the surface of the sample; in high-purity Fe the diffusion takes place predominantly along the grain boundaries. (N1; Fe, *Mn*)

467-N. (Russian.) **Solubility of Zinc in Metallic Compounds Cu_2Mg and Cu_2Cd.** Ye. I. Gladyshevskiy and P. I. Kripyakevich. *Izvestiya Sektora Fizika Khimicheskogo,* v. 27, 1956, p. 209-211.

Solubility of Zn in Cu_2Mg is from 2 to 6 at. %. Solubility in Cu_2Cd

is considerably lower, about 3%. Difference is explained by the greater electron capacity of Cu_2Mg. The computed magnitudes of the limiting electron concentration for Cu_2Mg and Cu_2Cd agree well with data for the solubility of Zn in these compounds.
(M24c; Zn, Cu, Mg, Cd)

468-N. (Russian.) **On the Transformations of the Silicide MnSi.** K. N. Davydov and P. V. Gel'd. *Fizika Metallov i Metallovedeniye,* v. 2, no. 1, 1956, p. 192.

At approximately 600° C. there is a sharp change in the character of the expansion curves of the alloys; a jump is seen in the temperature dependence of the heat content and a rapid decrease in electrical conductivity. This leads to the conclusion that phase transformations may occur in the silicide Mn_5Si at approximately 600° C. (N6p; Mn, Si)

469-N. (Russian.) **Role of the Surface in the Graphitization of White Cast Iron.** K. P. Bunin, I. V. Grechnyi and N. M. Danil'Chenko. *Liteinoe Proizvodstvo,* no. 5, 1955, p. 12-15.

Formation of graphitic inclusions proceeds irregularly over a cross section; they form readily in the surface zones and less so in the center. Where the section is small, graphitization takes place throughout, but is limited in thick parts. The phenomenon is explained by the molecular picture of the process when the formation of graphite is related to the migration of vacancies from the exterior surfaces mainly as a result of the laws of diffusion and dislocations; thicker test pieces require more for complete graphitization. (N8s; CI-p)

470-N.* (Russian.) **Effect of Cooling Rate on Graphitization of White Iron.** O. M. Galemina. *Liteinoe Proizvodstvo,* June 1958, p. 17-19.

Increasing the cooling rate gives rise to formation of disoriented dendrites in center of chill mold, reduces rate of development of eutectoid crystals and leads to formation of shrinkage holes, greater friability and other defects. 9 ref. (N8s; CI-p, 9-67)

471-N. (Russian.) **Some Problems of the Theory of Graphitization of Malleable Cast Iron.** A. A. Egorov. *Nauchneye Trudy Moskovskoe Poligraficheskogo Instituta,* v. 3, 1955, p. 113-134.

Graphitization centers occur during the annealing of white iron only through the indirect decomposition of Fe_3C. Factors are temperature of graphitization — the higher the temperature, the more centers of graphitization are formed; shape and size of Fe_3C crystals—the finer the Fe_3 crystals, the faster the indirect decomposition, other conditions being equal. (N8s; CI-s)

472-N. (Russian.) **Properties of Tin and Tin-Lead Solders at Low Temperatures.** A. S. Medvedev. *Tsvetnye Metally,* no. 2, 1954, p. 52-60.

Effect of additions on the rate of transformation of white to gray tin; up to 0.5% Sb and about 0.3% Bi prevent the transformation. There is also in white Sn a reversible brittle transformation at −30° C. This greatly lowers the impact value of tin solders at low temperatures.
(N6p, Q6n, 2-63; Sn, *Pb,* SGA-f)

473-N. (Russian.) **Estimation of the Percentage Transformation of Retained Austenite in Spring Strip.** G. E. Egorov, G. T. Nazarenko and V. P. Moiseev. *Zavodskaya Laboratoriya,* v. 23, no. 1, 1957, p. 52-55.

Structural transformations during heat treatment of 70S2kHA strip are followed by measuring the magnetic saturation and coercive force. The saturation was measured by calculation of the contraction between the poles of an electromagnet, and coercive force by the induction method of dropping a measuring coil into an open magnetic circuit in a hollow solenoid. After 1½ hr. tempering at 400° C. there was practically no retained austenite. Martensite decomposes rapidly in the same temperature range. In continuous furnaces in which strip remains for tempering only 35 sec., only 25% of the retained austenite decomposed at 400° C. (N8, 1-54, M23a; ST, SGA-b)

474-N. (Russian.) **Diffusion of Hydrogen Through Iron and Binary Iron-Chromium and Iron-Nickel Alloys at High Pressures and Temperatures.** A. A. Shicherbakova. *Zhurnal Prikladnoi Khimii,* v. 29, no. 6, 1956, p. 879-884.

Speed of diffusion of hydrogen through Fe-Cr alloys at 100 atm.

pressure and temperature from 200 to 600° C. diminishes considerably when the Cr content is increased to 19%. The speed through Fe-Ni alloys increases with addition of Ni from 1.29 to 10%, but further increase of Ni from 10 to 20% causes a considerable reduction in speed.
(N1e, 2-61, 3-74; Fe, *Ni*, *Cr*, *H*)

475-N. Crystals Can Be Stronger. *Chemical and Engineering News*, v. 36, Sept. 8, 1958, p. 51-52.

Experiments in growing perfect single crystals at General Electric. (N3r)

476-N. Electrolytic Transfer of Carbon in Liquid Iron-Carbon Alloys. M. A. Rabkin. *Journal of Applied Chemistry of the USSR*, v. 30, 1957, p. 832-835. (Translation by Consultants Bureau, Inc.)

It was shown by a study of the action of an electric field on liquid iron-carbon alloys that the carbon in these alloys exists in the form of positively charged ions. 10 ref. (N1e; Fe, C)

477-N. On the Theory and Computations for the Introduction of Elastic Oscillations Into Molten Metals. I. I. Teumin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 13-27. (Available from U. S. Office of Technical Services, Washington 25, D. C.; also available as Henry Brutcher, Altadena, Calif., Translation no. 3930.)

Previously abstracted from original. See item 296-N, 1957.
(N12, 1-74; 14-60)

478-N. On the Mechanism of the Influence of Aluminum on the Secondary Austenite Grain in Steel. D. S. Kamentskaya and I. B. Piletskaya. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 52-59. (Available from U. S. Office of Technical Services, Washington 25, D. C.; also available as Henry Brutcher, Altadena, Calif., Translation no. 4033.)

Previously abstracted from original. See item 365-N, 1957.
(N2, N3, P13a; ST, Al)

479-N. On the Change of Coercive Force in Low-Temperature Tempering. N. S. Fastov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 148-150. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Considered as a result of redistribution of carbon concentration and consequently as a result of redistribution of stresses. 7 ref. (N8a, J29)

480-N. A Study of the Self-Diffusion of Alpha Iron. V. M. Golikov and V. T. Borisov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 365-376. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Temperature dependence of coefficient of self-diffusion of alpha iron determined in the range 650 to 850° by radioactive istopes. 8 ref. (N1d, 1-59; Fe)

481-N. Theory of Methods for Determining Concentration Dependencies of Diffusion Coefficients in Solid Solutions. B. Ya. Lyubov and B. I. Maksimov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 377-400. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Method using radioactive indicators. 6 ref. (N1a, 1-59)

482-N. Laws of Crystal Growth During Electrolysis. K. M. Gorbunova. Paper from "Growth of Crystals", Consultants Bureau, 1958, p. 39-45.

Microscopic observations on crystal growth at the cathode at very low currents show that at the instant of formation the crystal form is limitingly simple and correct; silver crystals take tetrahedral or octahedral forms, more rarely cube ones. The faces grow by expansion of layers which most frequently start at the edges. 10 ref. (N12d)

483-N. Growth Mechanism and Structure of Metal Deposits Produced by Electrocrystallization. K. M. Gorbunova, O. S. Popova, A. A. Sutyagina and Yu. M. Polukarov. Paper from "Growth of Crystals", Consultants Bureau, 1958, p. 46-52.

Certain regularities in the growth of cathodic metal deposits in electrolytic cells, either as dense coatings or friable dendritic structures have been observed. Both types are widely used in technology. By

varying deposition conditions, deposits with the most varied technically useful properties (high hardness and wear resistance, defined electrical and magnetic properties) can be obtained. 16 ref.
(N12d, Q-general)

484-N. **A Study of the Diffusion of Carbon in Nickel and Its Alloys by Means of the Radioactive Isotope C^{14}.** P. L. Gruzin, Iu. A. Polikarpov and G. B. Fedorov. *Physics of Metals and Metallography,* v. 4, no. 1, p. 74-80. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 385-N, 1957.
(N1, 1-59; Ni, *C*)

485-N. **Stress Relaxation in Aluminum Magnesium Alloys.** M. G. Gaidykov and V. A. Pavlov. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 99-105. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 386-N, 1957.
(N4; Al, Mg)

486-N. **Concerning the Mechanism of the Formation of Spheoidal Graphite in Cast Iron.** I. E. Bolotov, V. I. Syreishchikova and S. G. Guterman. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 144-146. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 387-N, 1957.
(N8s; CI-r)

487-N.* (German.) **Theory and Practical Application of Relief Diffusion.** Hansfriedrich Hadamovsky. *Bergakademie,* v. 9, Dec. 1957, p. 621-624.

The undersirable formation of coarse grains by recrystallization resulting after exceeding a minimum deformation or a certain annealing temperature can be controled by metallic additions. For Al, traces of Mg, Zn, Si, Cu, Mn, Fe promote the critical deformation limit or the temperature limit. This ability increases from Mg to Fe in the sequence shown. An Fe addition of 0.043 at. % (0.09% by weight) delays recrystallization and also reduces the grain notably. 24 ref.
(N1c, N4, 2-60; Al)

488-N.* (German.) **Investigations on Banded Structure in Plain Carbon and Alloy Structural Steels.** Erwin Plockinger and Alfred Randak. *Stahl und Eisen,* v. 78, July 24, 1958, p. 1041-1058.

The secondary structure after hot working is determined by the primary structure of the ingot. In the gamma-alpha transformation of plain carbon steels, as a result of the separation of carbon the ferrite is found within the interdendritic regions while the pearlite enters the dendritic branches. With alloyed steels, the dendritic branches contain the ferrite (i.e., the separation of carbon takes place in reverse direction). Additions of Si, Mn, P, Cr, Mo, Ni and their influence on the secondary structure.
(N12b, 2-60; CN, AY)

489-N. (Russian.) **Concerning the Mechanism of Surface Saturation of Iron and Steel by Boron.** G. V. Samsonov and N. Y. Tseytina. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 303-306.

In pure iron there is a diffusion reaction of boron with formation of iron boride FeB, causing relatively high micro hardness of the saturated layer (on the order of 730 to 790 kg. per sq. mm.). In the presence of carbon the reaction consists mostly of diffusion on the boundaries of the grain of the solid solution of complicated carboborides, causing the high hardness of the saturated layer (on the order of 1400 to 2100 kg. per sq. mm.).
(N1e, Q29n; ST, *B*)

490-N. (Russian.) **Carbide Formation in Tempering of Chromium-Nickel Steels and Chromium-Nickel-Tungsten Steels.** S. Z. Bokshteyn, S. T. Kishkin, A. F. Platonova and N. M. Popova. *Fizika Metallov i Metallovedenie,* v. 1, no. 3, 1955, p. 459-466.

Investigation of carbide formation in Cr-Ni steel (0.4 C, 1.96 Cr and 2.75% Ni) and in Cr-Ni-W steel (0.38 C, 1.71 Cr, 2.09 Ni and 1.51% W) after hardening from 960° and tempering, as a function of temperature (200 to 650°) and of time of soaking. (N8r, 2-64; AY, *Cr, Ni, W*)

491-N. (Russian.) **Diffusion of Nitrogen in Steels Alloyed With Chromium and Manganese.** A. G. Lesnik, P. I. Nekrashevich and V. Sirik. *Naukovi Zapyski Kyivskoho Institutu,* v. 14, no. 8, 1955, p. 125-126.

Evaporation in vacuum was used to investigate diffusion of nitrogen in Fe-Cr alloys (4.71% Cr) and Fe-Mn (2.21% Mn). Activation energy of diffusion of N in alloys and in pure iron was determined.
(N1e; AY, *Cr, Mn, N*)

492-N. (Russian.) **Neutralizing the Adverse Effects of Chromium in Malleable Cast Iron by Modifying With Ferrotitanium and Aluminum.** V. K. Obolonnyi, V. N. Pliutovich and I. A. Stepanov. *Trudy Studencheskogo Nauchno-Tekhnicheskogo Obshchestva Moskovskogo Tekhnicheskogo Uchilishcha Imeni Baumana,* v. 3, 1957, p. 67-75.

The cast irons under study contained 0.04, 0.13 and 0.19% Cr. The adverse effect of Cr in quantities up to 0.18% can be neutralized by ferrotitanium or Al. To prevent the appearance of cracks in sections 20-25 mm. thick it was decided to add to the ladle 0.01% Te or Bi, which do not affect the graphitization of malleable cast iron during annealing. (N8s, 2-60; CI-q, *Cr, Ti, Al*)

493-N. (Russian.) **Relationship Between Conditions of Solidifications and the Texture and Mechanical Properties of Cast Iron.** G. V. Chertkov. *Trudy Vsesoyusnogo Zaochnogo Instituta Lesotekhniki,* no. 2, 1956, p. 105-121.

Making use of known thermophysical constants calculations were made of the temperature distribution in iron castings having a cross-section 92 by 92 mm. at various times after the beginning of solidification. The temperature gradient is significant and determines the various sizes of graphite grain on the periphery and at the center of castings. (N12, E25n; CI)

494-N. The Martensite Phase Change in Metals. M. A. Jaswon. *Research Applied in Industry,* v. 9, Aug. 1958, p. 315-323.

Crystallographic aspects, relating the austenite-martensite transformation to feasible slip processes in the two lattices. 22 ref. (N8p)

495-N. (Russian.) **Alpha $\rightleftarrows$ Beta Transformation of Zirconium, Observed With the Field Emission Electron Microscope.** A. P. Komar and V. N. Shrednik. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 452-464.

23 ref. (N6, M21e)

496-N. (Book.) **Growth of Crystals. First Conference on Crystal Growth, 1956.** 294 p. 1958. Consultants Bureau, Inc., 227 W. 17th St., New York 11, N. Y. $15.

Papers presented at the Institute of Crystallography, Academy of Sciences of the U.S.S.R. Relevant papers are abstracted separately. (N12)

497-N. (Book.) **Problems of Metallography and the Physics of Metals. Fourth Symposium.** B. Ya. Lyubov, ed. 476 p. 1958. *U. S. Atomic Energy Commission,* AEC-tr-2924.

Papers on structure of liquid metals, crystallization processes and physical means of influencing their kinetics, phase transformations in steel, strengthening and weakening of steel and alloys, determination of diffusion parameters in alloys by means of radioactive isotopes and physical chemistry of metallurgical processes. Papers are abstracted separately.
(N-general, M-general, Q-general)

498-N. The Non-Martensitic Diffusionless Transition in Manganese Arsenide at About 40° C. Z. S. Basinski and W. B. Pearson. *Canadian Journal of Physics,* v. 36, Aug. 1958, p. 1017-1021.

It appears that plastic deformation of MnAs is impossible and so, instead of the change following the martensitic pattern, the strain energy of the transformation is minimized by a fragmentation of the crystal grains into pencil-like subgrains. 10 ref. (N6; Mn, As)

499-N. Diffusion of Cerium and Zirconium in Molten Uranium. T. Smith. *U. S. Atomic Energy Commission, NAA-SR-2628,* 1958, 26 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Coefficients measured over the range 1170 to 1480° C. An equation relates the diffusion coefficient and temperature. The diffusion coefficient for Ce at 1200° C. is 1.0×10^{-4} sq. cm. per sec. The solubility of Ce in molten U varies from 1 to 2% by weight over the range 1140 to 1345° C. Experimental errors involved in measuring diffusion coefficients at high temperatures. 6 ref. (N1b, 2-62; Ce, Zr, U)

500-N. Progression of the Freezing Front and the Temperature Distribution in Ingots During Solidification. J. W. Hlinka and V. Paschkis. *American Society for Metals, Transactions,* Preprint no. 97, 21 p.

Progression of freezing and temperature distribution in the liquid and solid regions of a slab-shaped

ingot in terms of the mold-melt interface temperature. The problem is the freezing of a finite slab of pure metal or eutectic alloy contained in a "sufficient" mold; the range of variables included metals commonly used in industry, superheated and nonsuperheated, as well as preheated and subcooled molds, with the conclusion that the dimensionless interface temperature and dimensionless superheat define the progress of solidification and temperature distribution. 4 ref. (N12; 5-59)

501-N. (Czech.) **Crystallization of Metals.** Premysl Rys. *Slevarenstvi,* v. 4, no. 9, 1956, p. 263-267.

Fundamental thermodynamic conditions for spontaneous crystallization characterized by the appearance of supercritical nuclei (homogeneous nucleation). Influence of nonmetallic inclusions and of the walls of the mold on hardening; nature of the crystallization process at the walls; action of various types of nonmetallic inclusions. Examples of the action of inclusions on structure. Methods to obtain fine crystallization structure of metals and alloys. (N12, P12, 9-69)

502-N.* (French.) **Conditions of Regeneration of Single Crystals of Alpha Uranium Containing Traces of Impurities After a Period of Several Hours in the Beta Phase.** Gerard Donze and Rene Faivre. *Comptes Rendus,* v. 246, June 30, 1958, p. 3619-3621.

As previously determined for iron, it is found that regeneration of U monocrystals in alpha phase is due to conservation of crystal nuclei throughout alpha-beta-alpha transformation. Due to anisotropy of expansion of U, this phenomenon is shown very clearly in curves of thermodilatometric analysis. 6 ref. (N6p; U, 14-61)

503-N.* (French.) **Settlement and Diffusion of Hydrogen in Iron.** J. Plusquelloc, P. Azou and P. Bastien. *Comptes Rendus,* v. 246, June 30, 1958, p. 3628-3631.

It is established that H settles in (112) planes. Interruption of electrolysis provokes a greater absorption of H when charging is recommenced. 7 ref. (N1c; Fe, *H*)

504-N. (Russian.) **Problem of the Anisotropy of the Speed of Growth of Crystals.** F. P. Tybalko. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 184-185.

A cylindrical bicrystal of Al was grown by passing a tube with molten Al (99.98%) through an electric furnace. The separation boundary of the crystals appears on the photograph as a saw-tooth line that parallels the generatrix of the cylinder. X-ray diffraction investigation shows that for one of the crystals the plane of the joint between the crystals, which makes an angle of 10° with the x axis, is the crystallographic plane (112). It is concluded that the rate of crystal growth has a different temperature dependence in different directions. (N12n; Al-a)

505-N. (Russian.) **Influence of Silver or Zinc Impurities in Aluminum on the Speed of Diffusion of Copper.** V. I. Arkharov and N. I. Noskova. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 472-476.

In a solid solution of Ag or Zn in Al, at high content of Ag or Zn (10 to 20%), the speed of diffusion of Cu is substantially greater than in pure Al. An explanation is offered for the previously established accelerating influence of small impurities (0.2%) of Ag (or Zn) on the speed of decomposition of supersaturated solid solution of Cu in Al. This can be caused by the positive internal adsorption of Ag (or Zn) taking place on the periphery of the produced particles of the phase that becomes precipitated from the very beginning stages of their formation, due to the particles turning out to be surrounded by zones of solid solution with increased concentration of Ag (or Zn). (N1e; Al-b, Ag, Zn, Cu)

506-N. (Russian.) **Cast Iron Sheet, Its Crystallization and Plastic Deformation in Cold and Hot States.** Ye. G. Nikolayenko and S. I. Vitenzov. *Novoye v Teorii i Praktike Liteynogo Proizvodstvo, Moskva-Leningrad Mashgiz,* 1956, p. 409-419.

Effect of conditions of primary and secondary crystallization and plastic deformation in cold and hot states on the structure and properties of cast iron sheets obtained by liquid rolling.
(N12, N5, Q24; CI, 4-53)

507-N. (Russian.) **Processes of Carbide Formation in Isothermal Decom-**

position of Alloyed Austenite. R. I. Entin. *Problemy Metallovedeniya i Fiziky Metallov,* v. 4, 1955, p. 239-250.

Structure of the carbide phase in Mo, Co-Mo and W steels investigated during the process of transformation at temperatures of the pearlite and intermediate regions, also after special binary treatments. Decomposition of the austenite in the pearlite temperature region in steels alloyed by carbide-forming elements is due to the formation of a carbide phase that is enriched with these elements, and consequently to a diffusion redistribution of the alloying elements. (N8r; AY, *Mo, Co, W*)

508-N. (Russian.) **Study of Auto-Diffusion of Alpha-Iron.** B. M. Golikov and V. T. Borisov. *Problemy Metallovedeniya i Fiziky Metallov,* v. 4, 1955, p. 528-542.

Modification of the absorption method, proposed for determination of small auto-diffusion factors, requires no preliminary determination of the absorption factor of the beta-radiation of the radioactive indicator. The processes taking place in the active layer and on the separating boundary layer-sample are taken into consideration. How to take the isotope composition of the compound into consideration is shown. Equation for the auto-diffusion of alpha-iron within the temperature interval from 650° to 850° is given. (N1d; Fe)

509-N. (Russian.) **Investigation of Diffusion Processes in Sintering Using Radioactive Isotopes.** L. M. Mirskiy, V. S. Rakovskiy and S. Z. Bokshteyn. *Poroshkovaya Metallurgiya, Yaroslavl',* 1956, p. 52-60.

Procedure developed made it possible to conclude that the ideas concerning the "hole" mechanism of diffusion are correct. The coefficients of diffusions determined for the alloys W-Ni, TiC-Mo, TiC-W and TiC-Cb coefficients make it possible to calculate the activation energy of W, Mo and Cb and consequently to determine the strength of the bond in the lattice.
(N1e, 1-59; H15; W, Ti, Cb)

510-N. (Russian.) **Investigation of the Process of Crystallization of a Solid Solution.** L. P. Zaytseva. *Trudy Leningradskogo Politekhnicheskogo Instituta,* no. 180, 1955, p. 13-31.

Crystallization of a solid solution under actual cooling conditions investigated in 14 alloys of the Cu-Si, Cu-Si-Mn, Al-Zn and Sb-Bi systems. Ratio of liquid and solid phases during crystallization process was fixed for each given instant by hardening, after which a metallographic investigation was made of the structure of the alloys on microsections, and microhardness measured. Change of concentration of the separating initial dendrites and of the parent solution was investigated by ultraviolet color microscope and local spectrography.
(N12p, Cu-b, Al-b, Sb-b)

511-N. (Russian.) **Investigation of Diffusion in Binary Alloys as a New Method of Physical-Chemical Analysis.** M. V. Neyman and A. Ya. Tsinyayev. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1257-1263.

The change in the coefficient of diffusion, D, the energy of activation, E, and the coefficient of the exponential D_0, as functions of the composition of the alloys were determined in Fe-Ni and Fe-Mo systems. In the Fe-Ni system, which in the temperature region from 900 to 1100° C., represents a continuous series of solid solutions of nickel in iron, D increases continuously, while E and log D_0 diminish continuously as functions of the alloy composition. In the Fe-Mo system, which contains the compound Fe_3Mo_2 in the temperature range 100 to 1200° C., D diminishes sharply and E and log D_0 increase sharply at the point corresponding to the chemical combination.
(N1e; Fe, Ni, Mo)

512-N. (Russian.) **Investigation of the Tempering Processes in an Iron-Nitrogen System.** V. G. Permyakov. *Metallovedenie i Obrabotka Metallov,* no. 7, 1956, p. 2-9.

Structure of commercial iron, hardened after nitriding at 600 to 900° C., and its variations in tempering. Observation of the nitrided austenite and martensite obtained in the nitride layer during heating shows a far-reaching analogy between the tempering of hardened iron nitride and iron carbide alloys. Tempering begins with the decomposition of the martensite, on which is superimposed at 190 to 310° C. the decomposition of the residual austenite. As a result of one or the other a mixture of ferrite and of a nitride gamma-prime phase of different dispersions is formed.
(N8a; Fe, N)

513-N.* **Conditioning Phenomenon in a High Chromium Steel.** S. C.

Das Gupta. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 207-217.

A 15% Cr, 0.7% C steel is studied under various conditions: without presence of initial martensite; in presence of initial martensite; plastically deformed specimens without any initial martensite. The degree of conditioning increases progressively with temperature of reheating above 300° C. However, in presence of initial martensite, an important change in the mode of formation of some of the martensite plates occurs above 450° C. 5 ref. (N8p; AY, *Cr*)

514-N.* A Study of the Early Stages of Tempering in a 0.2% C, 9% Cr and 0.38% V Steel. A. K. Seal. *Indian Institute of Metals, Transactions,* v. 11, June 1958, p. 73-88.

Mechanism of the early stages of tempering studied by long-time isothermal tempering at 170° C. for up to 1000 hr. Specimens were examined by hardness measurements, optical and electron microscopic studies, X-ray examinations of the carbide extracts and electron diffraction studies of the extraction replicas. It was found that the iron carbide formed at this temperature possessed an imperfect cementite structure. An attempt has been made to correlate the hardness and electron microstructural changes on tempering. 5 ref. (N8a; AY, *Cr, V*)

515-N.* (French.) Determination of Coefficients of Diffusion and Study of the Kirkendall Effect on the Couple Uranium-Titanium. Yves Adda and Jean Philibert. *Comptes Rendus,* v. 247, July 7, 1958, p. 80-83.

Concentration-penetration curves in U-Ti diffusion couple between 950 and 1075° C., coefficient of chemical diffusion determined as function of concentration. Quantitative study of Kirkendall effect; coefficients of intrinsic diffusion of U and Ti calculated. 4 ref. (N1e; U; Ti)

516-N.* (French.) Influence of Tungsten on the Kinetic Parameters of the Formation of Proeutectoid Ferrite. Karel Mazanec and Josef Cadek. *Revue de Metallurgie,* v. 55, June 1958, p. 501-512.

Tungsten decreases speed of nucleation of proeutectoid ferrite in temperature range 675-745° C. virtually independently of temperature. In low-temperature domains (below 650° C.), W causes decrease in rate of grain growth, while this rate remains practically constant at temperatures above 740° C. Role of time in speed of nucleation was also investigated. After period of incubation, speed of nucleation increases rapidly and, after reaching a maximum, decreases according to a hyperbolic curve. Speed of grain growth follows same hyperbolic pattern. Activation energy (33,600 cal. per mol.) proves that speed of growth is controlled by speed of diffusion of carbon in austenite. 21 ref. (N2, N8j; 2-60; AY, *W*)

517-N.* (French.) Determination of Volume Self-Diffusion Constants of Iron in the Alpha Phase by Means of Radioactive Isotopes. Claude Leymonie and Paul Lacombe. *Revue de Metallurgie,* v. 55, June 1958, p. 524-530.

A layer of Fe^{55} and Fe^{59} radioisotopes is deposited on surface of thin platelets of Armco iron. During a diffusion anneal under vacuum, activity of both sides of sample is measured periodically. A ratio exists between variation of measured activities and coefficient of diffusion. Experiments were conducted on polycrystalline specimens at temperatures above 850° C., on monocrystals at temperatures under 850° C. Under conditions described, variation of coefficient of diffusion D at absolute temperature T can be expressed by $D = 18 \exp. (-64000/RT)$. 8 ref. (N1d, 1-59; Fe)

518-N.* (Italian.) Influence of Zirconium in Association With Manganese on Recrystallization and Mechanical Properties of Ac 11 Alloy Extrusions. E. Di Russo and D. Gualandi. *Alluminio,* v. 27, July-Aug. 1958, p. 321-329.

Six Al alloys, three with and three without Zr additions, were studied. Recrystallization structure of extrusions is improved by addition of 0.15-0.20% Zr in presence of 0.3-0.4% Mn. This composition makes it possible to avoid stains, marbling and other undesirable effects caused by segregation of intermetallic compounds of Al-Mn and Al-Fe-Mn in anodized Ac 11 alloy when Mn content is 0.7%. Improvement in mechanical properties noted. 7 ref. (N5, Q-general, 2-60; Al-b, *Zr, Mn,* 4-58)

519-N. (Russian.) **Anisotropy of Crystal Growth Speed.** F. P. Rybalko. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 184-185.

It was found on X-ray study of a monocrystal of Al (99.98%), grown in a melt, that the crystal growth speed in different directions depends on temperature. (N3r; Al-a)

520-N. (Russian.) **Mechanism of Structural Transformations in Aging Alloys With a Nickel Base.** Yu. A. Bagaryatskiy and Yu. D. Tyapkin. *Kristallografiya,* v. 2, no. 3, 1957, p. 419-423.

X-ray structural method (oscillation X-ray photographs by "transmission" and by "reflection" in K_o-Cr, Fe, Ni, Cu, and Mo radiation) and X-ray photographs of diffusion scattering in K_o-Mo radiation have been used to study the aging of single crystals of alloys Ni-Al, Ni-Ti, Ni-Cr-Al, Ni-Cr-Ti, Ni-Al-Ti, including the Nimonic-80 type of alloy. The alloys become inhomogeneous even in the region of equilibrium solid solutions (1200-1300° C.). The dimensions of the irregularities observed in the hardened alloys depend on the content of Ti and Al and on the heating temperature. (N7a, M22g; Ni-b, 14-61)

521-N.* (English.) **Solution Anisotropy and Shape of Solution Body in Crystals.** Mikio Yamamoto. *Tohoku University, Science Reports of the Research Institutes,* v. 10, no. 3, June 1958, p. 183-200.

Derives from phenomenological considerations, taking into account crystal symmetry, the expressions for anisotropy of the solution rate and for the shape of the solution body in hexagonal, rhombohedral, tetragonal and cubic metal crystals. Data from theoretical formula for anisotropy of solution rate in accord with available experimental values. 13 ref. (N12, M26)

522-N.* (English.) **Diffusion of Silicon and Manganese in Liquid Iron. Pt. 1. Diffusion in Liquid Iron Saturated With Carbon.** Tunezo Saito and Kazuo Maruya. *Tohoku University, Science Reports of the Research Institutes,* v. 10, no. 3, June 1958, p. 259-268.

Diffusion coefficient determined for temperatures between 1300 and 1600° C. by the method of "semi-infinite medium". Diffusion coefficients of Si were 2.0 to 2.8 $\times$ 10^{-5} sq. cm. per sec. and activation energy of 8.2-k. cal. per g. atom. Diffusion coefficients of Mn were 3.0 to 4.1 $\times$ 10^{-5} sq. cm. per sec. and activation energy was 5.8 k.cal. per g. atom. 10 ref. (N1b; Si, Mn, Fe. 14-60)

523-N. (Russian.) **Decompositon of Solid Solution in Thin Laminae.** M. I. Zakharova and I. N. Soboleva. *Doklady Akademii Nauk SSSR,* v. 108, no. 5, 1956, p. 841-842.

Using X-ray diffraction and the variation of the lattice constant during tempering, an investigation was made of the dependence of the decomposition process on the dimensions of the specimens. Specimens 0.4, 0.02 and 0.004 mm. thick of a solid solution of Cu in Al were hardened and annealed for 1 hr. at temperatures from 180 to 320° C. After tempering at 180, 200, 220, 240, 300 and 320° C., the lattice constant of all the specimens was found to vary smoothly (i.e., homogeneous decomposition of the solid solution took place). After tempering at 260 and 280° C., the thinner specimens (0.02 and 0.004 mm.) exhibited regions of solid solution with a different degree of supersaturation. (N7, M26p, 1-60; Al, *Cu*)

524-N. (Russian.) **Recrystallization. Diagrams for Titanium and Titanium Alloys.** E. M. Savitzky, M. A. Tylkina and A. N. Turnaskaya. *Izvestiia Akademiia Nauk USSR, Otdelenie Tekhnicheskikh Nauk,* no. 7, 1956, p. 111-114.

Recrystallization diagrams of titanium iodide and titanium thermal magnesium (brand BTI-D) are plotted, which link together the size of metal grain with the deformation degree and with the subsequent annealing temperature or with the hot deformation temperature; recrystallization of hot rolled Ti calcium hydride also studied. (N5; Ti)

525-N. (Russian.) **Dependence of the Crystal Growth Shape on the Growth Speed.** V. I. Malkin. *Problemy Metallovedenya i Fiziky Metallov,* v. 4, 1955, p. 113-120.

Dependence of growth shape on growth speed of a salol crystal growing in a melt and the connection between growth speed and the

structure in an ingot of Sn. The transition to an acicular growth shape is observed, when growth speed of the crystal increases. When undercooling is decreased, growth speed decreases also, and the growth of crystals of acicular shape is replaced by the growth of crystal of regular shape. The same transition to an acicular structure with the increase of growth speed was observed also in an ingot of Sn.
(N12; Sn)

526-N. (Russian.) **Effect of Elements That Form Difficultly Soluble Carbides on the Decomposition of Austenite.** L. I. Kogan and P. I. Entin. *Problemy Metallovedenya i Fiziky Metallov,* v. 4, 1955, p. 251-286.

When hardening from ordinary heat treating temperatures (900 to 1000° C.), the presence of such strongly carbide-forming elements as Ti, V, Zr, Cb and Ta reduces the hardenability of carbon steel, owing to the formation of quite stable carbides by these elements. A partial transformation of these carbides into austenite when heating to 900 to 1000° C. can be accomplished by alloying the steel with manganese (1.5 to 2.5%). In this case, addition of Ti to Mn steel increases considerably the stability of the austenite in the pearlite and intermediate regions.
(N8r, 2-60; AY, *Mn, Ti*)

527-N. (Russian.) **Radioactive Tracer Investigation of the Distribution of Chromium and Tungsten During the Process of Austenite Decay.** S. V. Tsivinskiy, L. I. Kogan and R. I. Entin. *Problemy Metallovedenya i Fiziky Metallov,* v. 4, 1955, p. 277-295.

Radioactive isotopes used to determine the contents of Cr and W in the carbide phase in steels with 1.18% C and 2.42% Cr and with 1.02% C and 0.78% W, respectively, in the process of transformation of austenite at the temperatures of the pearlite and intermediate regions. In the process of decomposition in the pearlite region, contents of the alloying elements in the carbides exceed their contents in steel by a factor of 3 to 5 times. Results prove that decomposition of the austenite in the pearlite region is connected with the need for diffusion redistribution of tungsten.
(N8h, 2-60, 1-59; AY, *Cr, W*)

528-N. (Russian.) **Influence of Alloying Elements on the Eutectoid Transformation in Steel.** N. T. Gudtsov and I. Chadek. *Sbornik Moskovskogo Instituta Stali,* v. 36, 1957, p. 13-32.

Investigation of carbide phase of the products of isothermal eutectoid transformation, of carbide phase formed during prolonged annealing of these products at the same temperature and of carbide phase of the products of tempering of martensite. Role of kinetic factors in eutectoid transformation; formation of the cementite is not a primary factor in the eutectoid reaction even when the latter is one of the stable carbide phases of the particular steel. (N8r, 2-60; AY)

529-N. (Russian.) **Relaxation and Recrystallization of Single-Phase and Aging Alloys With a Nickel Base.** S. S. Gorelik, Yu. V. Gracheva, N. O. Borneyev, I. G. Skugarev and E. N. Spektor. *Sbornik Moskovskogo Instituta Stali,* v. 36, 1957, p. 103-130.

Influence of 1 to 20% Cr on recrystallization temperature of Nichrome. Compared with Ni, Nichrome has a considerably higher recrystallization temperature. Introducing into Nichrome alternately B, Mo and W, while retaining the single-phase nature of the alloy, has little effect on the temperature of the start of recrystallization but shifts the temperature of the end of recrystallization upward. Introducing elements that cause aging leads to a considerable increase in recrystallization temperature, with the strongest effect being exhibited by Al, Ti, Al + Ti, Al + Ti + Mo, Al + Ti + Mo + W.
(N5, 2-60; Ni-b)

530-N. (Russian.) **Effect of Tungsten on the Kinetic Parameters of the Formation of Ferrite in Isothermal Transformation of Austenite.** I. Chadek and K. Mazanets. *Sbornik Moskovskogo Instituta Stali,* v. 36, 1957, p. 147-159.

In the range from 675 to 740° C., W reduces the speed of formation of nuclei, and the rate of increase diminishes noticeably with increasing W, particularly at low temperatures (below 650° C.), and hardly diminishes at higher temperatures (about 745° C.). At greater supercooling, rate of growth is determined by diffusion of carbon in the austenite, and at smaller supercooling, by formation of double nuclei. Rate of formation of nuclei diminishes at small degrees of super-

coolings, due to the influence of W on surface tension at the boundary of the gamma grain.
(N8g, 2-60; AY, *W*)

531-N. (Russian.) **Theory of the Growth of Centers of a New Phase in Isothermal Decomposition of Austenite.** B. Ya. Lyubov. *Trudy Nauchno-Tekhnicheskogo Obshchestva, Chernoy Metallurgii,* v. 3, 1955, p. 39-44.

Theoretical analysis of the growth of centers of a new phase in the isothermal decomposition of supercooled austenite. The new phase (ferrite, cementite or pearlite) differs from the initial one (austenite) in its structure as well as in its composition. Consequently, the redistribution of the dissolved matter combines in the phase transition with the transition of the solvent from one structural form to another. The kinetics of the growth process of the center, by which the particular components of its simple processes cause a minimum rate of displacement of the boundary between the phases, are determined. (N8g)

532-N.* **The Preparation and Properties of Gallium Arsenide Single Crystals.** J. M. Whelan and G. H. Wheatley. *Physics and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 169-172.

Preparation of gallium arsenide single crystals by the floating-zone method. These crystals have resistivities in the range 10^{-2} to 10^{-6} omega-cm. Hall coefficient and conductivity were measured for five n-type samples in the temperature range 50-900° K. An impurity level 0.54 ± 0.05 eV below the conduction band is believed to be responsible for the high-resistivity sections of the crystals. 12 ref.
(N3r, P15, Ga, As, 14-61)

533-N.* **Diffusion, Solubility and Electrical Behavior of Copper in Gallium Arsenide.** C. S. Fuller and J. M. Whelan. *Physics and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 173-177.

Copper diffuses into GaAs single crystals at rates comparable to those found for Cu in Si and Ge. As with Ge, the diffusion appears to follow the dissociative mechanism. Autoradiographic evidence for this. The diffusion process requires both interstitial and substitutional roles for Cu. Solubility of Cu in single crystals of GaAs determined from 700 to 1160° C. by means of Cu^{64}. 10 ref. (N1, P15, Cu, Ga, As)

534-N.* **Thermodynamics of Ordering Alloys. Pt. 3. Energies of Transformation of the $Au_{\frac{1}{2}}Cu_{\frac{1}{2}}$ Phases.** R. A. Oriani and W. K. Murphy. *Physics and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 277-279.

Energy differences among the two superlattices and the disordered solid solution at the composition $Au_{\frac{1}{2}}Cu_{\frac{1}{2}}$ have been derived from calorimetric measurements of the heats of formation of the three phases. It is shown that neither of these transitions is understood in terms of quasi-chemical theory. 10 ref. (N10b, P12q; Au, Cu)

535-N. (Czech.) **Setup for Growing Single Crystals of Metals.** Bohdan Sestak. *Ceskoslovensky Casopis pro Fysiku,* v. 7, no. 2, 1957, p. 202-208.

Crystals were grown in an atmosphere of argon at atmospheric pressure. Protective atmospheres are purified of oxygen and dried in a special apparatus during growth of the single crystals. Procedure of growing single crystals of Cu and Ni is by the Bridgeman method. Cu crystals of 12 mm. diameter and 99.95% purity were grown in a graphite crucible at velocities of 37.2 to 76 mm. per hr., and Ni crystals 99.85% pure and 15 mm. in diameter were grown in a crucible made of pure sintered Al at a crucible displacement rate of 9.1 to 25 mm. per hr. (N3r; Cu, Ni)

536-N.* (German.) **Essential Features of the Discontinuous Precipitation in Zinc-Copper and Copper-Silver Alloys.** W. Gruhl and H. Kramer. *Metal,* v. 12, Aug. 1958, p. 707-712.

In discontinuous precipitation the grain boundary moves into the adjacent crystal. By tests with an alloy of Zn and electrolytic Cu, process of discontinuous precipitation and correlation between discontinuous and continuous precipitation is shown. Displacement of grain boundary explained by liberated energy resulting from the boundary itself as well as from the solid solution. 15 ref. (N7; Zn, Cu, Ag)

537-N.* (Japanese.) **Precipitation of Alpha Phase in Magnesium-Lithium**

Beta Phase Alloy by Preferential Oxidation of Lithium. S. Morozuni, S. Matsuo and T. Takeuchi. *Nagoya Industrial Experimental Station, Report,* v. 7, July 1958, p. 504-510.

Specimens are Mg alloy with 11% Li beta phase, cold pressed, cut, annealed at 350° C. and then heated at 500° C. in silica tube under 10^{-2} mm. Hg. Fine precipitates are found along the grain boundary of the matrix, which was a single-phase solid solution and, after a few hours, grow with distinct orientation. Debye-Scherrer X-ray diffraction patterns show that closed-packed hexagonal phase has appeared in body-centered cubic lattice. The orientation of the precipitates is analyzed by stereographic projection diagram which is drawn according to the knowledge from Laue spots. The new alpha-phase could be platelets parallel to {112} plane of the matrix. (N7; Mg, *Li*)

538-N. (Russian.) **Aging of the Al-Cu Alloy.** N. N. Buynov. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 339-348.

The Guinier-Preston zones 1 are present in the alloy immediately after hardening. During the process of low-temperature aging, the zones increase and become enriched with Cu, and the Guinier-Preston zones 1 become Guinier-Preston zones 2. The basic feature of artificial aging during the stage of vigorous strengthening of the alloy is the enrichment of the existing zones by Cu and their allotropic transformation into particles of the theta-prime phase.
(N7a, N6p; Al-Cu)

539-N. (Russian.) **X-Ray Diffraction and Electron-Microscope Investigation of Aging of an Al-Zn Alloy.** N. N. Buynov and L. I. Podrezov. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 349-358.

In the initial stage of aging, the Guinier-Preston zones hardly differ in structure from that of the matrix, are coherently connected with it, and are little saturated with the Zn atoms. Ths first stage of aging is significant in the enrichment of the zones with Zn. It leads to a distortion of the structure of the zones themselves and of the adjacent solid-solution regions, as evidenced by the asymmetry of the anomalous effects (diffused and linear) of the characteristic radiation. When the Zn concentration in the zones reaches almost 100%, the cubic lattice turns into the hexagonal lattice of Zn (second aging stage—separation).
(N7a, M21e, M22g; Al-a, *Zn*)

540-N. On the Growth and Properties of Electrolytic Whiskers. P. B. Price, D. A. Vermilyea and M. B. Webb. *Acta Metallurgica,* v. 6, Aug. 1958, p. 524-531.

Under certain conditions metal electrodeposited from solutions containing certain specific impurities takes the form of whiskers varying in diameter from about one to several microns and as long as several millimeters. A theory is advanced to account for the growth of electrolytic whiskers and is compared with experimental observations. Data on strength, electrical resistivity and structure of whiskers. 11 ref. (N3r, N12d)

541-N. Grain Growth on α-Brasses. P. Feltham and G. J. Copley. *Acta Metallurgica,* v. 6, Aug. 1958, p. 539-542.

13 ref. (N3; Cu-n)

542-N.* Formation of Ferrite and Pearlite in Cast Iron. G. Ohira and K. Ikawa. *Modern Castings,* v. 34, Oct. 1958, p. 60-66.

Formation of ferrite and pearlite studied in iron-carbon, iron-carbon-silicon alloys and charcoal pig iron. At the eutectoid temperature pearlite was nucleated by cementite which had precipitated on cooling after solidification; ferrite crystallized out on precipitated graphite. Pearlite formation was promoted when the Fe contained P or Sn. Ferrite formation was promoted by Mn. 5 ref. (N8h, N12; CI)

543-N.* Diffusion of Cadmium Into Single Crystals of Copper. Tokutaro Hirone, Nobuhiko Kunitomi, Masanobu Sakamoto and Hideo Yamaki. *Physical Society of Japan, Journal,* v. 13, Aug. 1958, p. 838-840.

Diffusivity measured in the range from 725 to 950° C. using radioactive isotope Cd^{115} as a tracer. Values obtained are compared with the corresponding values for the diffusion of Zn into Cu to investigate the effect of the difference in atomic radii.
(N1e, 1-59; Cu, *Cd,* 14-61)

544-N. Investigation of Germanium-Silicon Alloys. C. C. Wang. Sylvania Electric Products, Inc. *U. S. Office of Technical Services,* PB 131422, Feb. 1955, 50 p. $1.25.

Experimental methods for preparing homogeneous Ge-Si alloys in polycrystalline form for all the compositions and in single-crystal form for the low-Si alloys. Isothermal solidification technique used in preparing the alloys. From the standpoint of devices and ease of preparation, the most useful alloys are in the range between 0 to 15 at. % Si. (N12, N3r; Ge-b, *Si*)

545-N.* The Diffusion of Hydrogen in Steel at Temperatures of −78 to 200° C. J. D. Hobson. *Iron and Steel Institute, Journal,* v. 189, Aug. 1958, p. 315-321.

Using cylindrical specimens cut from large forgings, it is shown that diffusion of hydrogen in carbon and alloy steels does not follow predictions of accepted exponential equation at temperatures below 150° C. Diffusion constant at a given temperature varies with steel composition but square relating rate of evolution and specimen diameter is followed approximately. Results of experiments on large castings in agreement with laboratory measurements. 13 ref. (N1, 2-61; ST, *H*)

546-N.* Behavior of Nitrogen in 3% Silicon Iron. R. E. Fryxell, N. Galitzine and F. S. Gardner. *Iron and Steel Institute, Journal,* v. 189, Aug. 1958, p. 327-332.

Vacuum fusion method, hydrochloric acid evolution method and chemical separation followed by X-ray identification of inclusions were utilized in studying influence of quenching temperature, time of heat treatment and steel composition on reactions of nitrogen in 3% silicon iron. Results interpreted in terms of solution precipitation equilibrium of silicon nitride (Si_3N_4). Re-evaluation of chemical analysis methods. 21 ref. (N7, S11, 2-64; Fe, *Si*)

547-N.* (German.) **X-Ray Observations on Age Hardening Properties of Aluminum - Magnesium - Zinc Alloy.** Hermann Schmalzried and Volkmar Gerold. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 291-301.

Phases occurring during the age hardening process in an alloy with 6.5% Mg and 3.5% Zn. In the cold hardening phase at 135° C. a separation of Mg and Zn atoms takes place accumulating alternately in (001) planes of the crystals. The Mg atoms cause lattice distortion limiting the cluster diameter to about 25 Å. Above 80° C. the semistable intermediate phase $MgZn_2$ was observed in two orientations. Above 190° C. an additional stable ternary phase T ($Al_2Mg_3Zn_3$) appears. 29 ref. (N7a; Al-b, *Mg, Zn*)

548-N.* (Russian.) **Effect of Nickel Additions on Phase Transformations in Al-Cu Alloys During Long-Time High-Temperature Anneals.** A. Z. Zhmudskii and P. A. Maksimyuk. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 34-37. (Henry Brutcher, Altadena, Calif., Translation no. 4319.)

Investigation conducted by X-ray analysis and microhardness tests. Introduction of Ni retards the diffusion process in Al-Cu-Ni alloys at elevated temperatures. This slows down the aging process and grain growth thereby increasing the heat resistance of Al alloys. Maximum amount of Ni needed to inhibit decomposition is 1%. Addition of 0.5% Ni in Al-Cu-Ni alloys impedes grain growth during heat treatment. (N3, N1, N7a, 2-60, Al-b, *Ni*)

549-N.* (Russian.) **Grain Refinement on High-Temperature Heating.** Ya. R. Rauzin. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 14-17. (Henry Brutcher, Altadena, Calif., Translation no. 4314.)

Study of grain structure of metals when heated near melting point. Heating of 99.5% pure Al wire shows a continual grain growth. At 400° C. the average grain size is 0.12 mm.; at 600° C. it increases to 0.81 mm. As result of very slow increase of heat (5° per hr.) the average grain size slightly increases to 0.14 mm. at 400° C. and to 0.92 mm. at 600° C. Conclusions: there is no relation between grain refinement and phase transformation. Very slow heating, even to very high temperatures, does not lead to grain refinement. Quick heating at high temperatures results in localized plastic deformation and recrystallization resulting in considerable grain refinement. 10 ref. (N3, N5; Al-a)

550-N.* Preparation of FeO, NiO and CoO Crystals by Halide Decomposition. R. E. Cech and E. I. Alessandrini. *American Society for Metals, Transactions,* v. 51, Preprint no. 82, 1958, 8 p.

New method for producing crystals of FeO, NiO and CoO. Oxide crystals are produced by elevated-temperature decomposition of metal halide in an atmosphere which has

hydrogen and water vapor in the proper ratio to be in equilibrium with the monoxide phase of the metal. The metal halide decomposition occurs on an MgO crystal surface and deposits oxide in an epitaxially oriented film. Oxide crystal films 500 microns thick have been produced. 6 ref.
(N3r; Fe, Ni, Co, 14-68)

551-N.* Diffusion Layer Formation in the Ternary System Aluminum-Magnesium-Zinc. J. B. Clark and F. N. Rhines. *American Society for Metals, Transactions,* v. 51, Preprint no. 85, 1958, 19 p.

Identity, order and structure of ternary diffusion layers studied in couples composed of Al and a series of Mg-Zn alloys, using metallographic and X-ray diffraction methods. The sequence of layers always corresponds to consecutive regions in the appropriate ternary isotherm of the phase diagram; the composition path represented by successive compositions in the diffusion couple deviates away from that component which diffuses the most rapidly. 10 ref. (N1e, M24c; Al, Mg, Zn)

552-N.* The Mechanism of the Allotropic Transformation in High Purity Iron. Erwin Eichen and J. W. Spretnak. *American Society for Metals, Transactions,* v. 51, Preprint no. 89, 1958, 16 p.

Studied using a thermionic emission microscope. Criterion for discerning the difference between a nucleation and growth mechanism and a shear mechanism. Mechanism of the allotropic transformation in high-purity Fe just below the A_{e3} temperature is a shear mechanism. As the degree of undercooling increased, the average length of the individual shears increased, and the average rest periods between shears decreased. 8 ref. (N6p; Fe-a)

553-N.* The Effect of Stress on the Eutectoid Decomposition of Titanium-Chromium Alloys. A. W. Goldenstein, A. G. Metcalfe and W. Rostoker. *American Society for Metals, Transactions,* v. 51, Preprint no. 92, 1958, 18 p.

Three Ti-Cr alloys have been forged in the beta range to give six systems with controlled amounts of each phase. The isothermal transformation at 400, 500 and 600° C. of each of these systems was followed by resistivity, X-ray diffraction, elastic modulus measurements and metallography. The transformation study was repeated under a stress which produced creep in 1000 hr. An acceleration of 4 to 7 times in the rate of transformation occurred under the action of this stress. Complete tensile test data were obtained at all stages of the transformation and plotted on the T-T-T diagrams. 12 ref. (N7c; Ti, Cr)

554-N.* Austenite Transformation and Incubation in an Alloy Steel of Eutectoid Carbon Content. R. A. Grange, P. T. Kilhefner and T. P. Bittner. *American Society for Metals, Transactions,* v. 51, Preprint no. 93, 1958, 19 p.

Transformation of austenite as it occurs isothermally and on continuous cooling was studied in a Ni-Cr-Mo steel whose carbon content was such that neither pro-eutectoid ferrite nor pro-eutectoid carbide formed. Comparison of the resulting T-T-T diagrams reveals that the methods proposed for correlating the two are unsatisfactory for this steel. This is because holding metastable austenite in certain temperature ranges, whether accomplished by isothermal treatment or by comparatively slow continuous cooling retards subsequent transformation at a lower temperature. 13 ref.
(N8; AY, *Ni, Cr, Mo*)

555-N.* A Study of the Solidification Process in Grey and White Cast Irons. A. G. Fuller and I. C. H. Hughes. *British Cast Iron Research Association, Journal,* v. 7, Aug. 1958, p. 288-298.

Using the quenching technique and thermal analysis, the mode of eutectic solidification of 2-in. bar castings is studied for a white iron and a hyper-eutectic flake graphite iron. The white iron eutectic solidification by the progressive growth of columnar crystals, from the edge to the center of the casting, to form a continuously thickening, sharply defined shell of solid, while the center of the casting remained completely liquid. The hyper-eutectic gray iron eutectic solidified in a similar manner to that of a hypo-eutectic gray iron. 5 ref.
(N12q; CI)

556-N.* Recrystallization of Thorium. E. J. Boyle. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 217-224.

Pure Th, prepared by decomposition of the iodide, recrystallizes in the range from 500 to 700° C. after 20 to 80% reduction by cold rolling. Ames Th, prepared by calcium reduction of the fluoride, recrystallizes in the range from 520 to 700° C. after 20 to 80% reduction by cold rolling. Carbon, which is the principal contaminant in Ames Th, does not appear to have a significant effect on the recrystallization temperature range. (N5; Th)

557-N. Precipitation of Cu in Ge. Pt. 2. Supersaturation Effects. A. G. Tweet. *Physical Review,* v. 111, July 1, 1958, p. 57-66.

Evidence for the nucleation of Cu precipitates upon a single type of nucleation site in a supersaturated solid solution of Cu in essentially dislocation-free Ge. (N7; Cu, Ge)

558-N. Growth and Properties of "Whiskers". S. S. Brenner. *Science,* v. 128, Sept. 12, 1958, p. 569-575.

Further research is needed to show why crystal filaments are many times as strong as large crystals. 69 ref. (N3r)

559-N.* Solid State Graphitization in Iron-Carbon-Silicon Alloys. Ariel Taub. *Foundry,* v. 86, Oct. 1958, p. 82-83.

Graphite rosette nucleation and growth in a hypo-eutectic white cast iron. Presence of a dark etching layer that contained flake graphite was observed around the growing rosettes. The process of graphitization is pictured as occurring in two steps; the precipitation of secondary globular carbides from austenite and the decomposition of globular carbides into graphite and carbon-depleted austenite. (N8s; CI-p, *Si*)

560-N.* Analyses for Diffusion During Plastic Deformation. J. Simmons and J. E. Dorn. *Journal of Applied Physics,* v. 29, Sept. 1958, p. 1308-1313.

General equation for self-diffusion in deforming media. Methods of analyses for determining the self-diffusivity as a function of time for prescribed strain histories given for special cases of linear diffusion. No unrealistic assumptions relative to the constancy of the diffusivity with time are made. (N1b, Q24)

561-N.* Phase Transition in Solid Mercury. C. A. Swenson. *Physical Review,* v. 111, July 1, 1958, p. 82-91.

A polymorphic transition in solid mercury which was initially discovered by Bridgman has been studied at lower temperatures and pressures than those previously used. The transition would occur at zero pressure and 79° K. if these data are extrapolated. However, the transition begins to show time effects and large pressure hysteresis at much higher temperatures, and below 93° K. it can only be made to run irreversibly and in the alpha-beta direction, and then only upon the application of several thousand atm. pressure. (N6p; Hg)

562-N. (Bulgarian.) **X-Ray Study of Aging Lead-Tin Alloys.** L. N. Larikov. *Doklady Bolgarskoi Akademii Nauk,* v. 9, no. 4, 1956, p. 65-68.

Monocrystals of alloys containing 4.5, 6.0 and 19.0% Sn, were prepared by Czochralski's method, tempered after homogenizing from 182°, and aged at room temperature. A conversion of the monocrystal in the aging process into a polycrystalline aggregate was detected, and the effect of the composition of the alloy on the time of aging was established. Changes of lattice spacing of the solid solution in the aging process investigated by means of a special precision focusing camera. (N7; Pb, Sn)

563-N. (Czech.) **Structural Changes in Low-Carbon Low-Alloy Steels on Tempering.** Foldyna Voznyak. *Hutnické Listy;,* no. 11, 1956, p. 663-669.

Electron diffraction diagrams were taken from two steels with 0.08% C and 1.24% V (at an atomic ratio V:C of 3.62) and with 0.11% C and 2.25% Mo (with an atomic ratio Mo:C of 2.56) in the course of a 2-hr. anneal in the range 200-700° C. Specimens were first austenitized for 15 min. at 1250° C. and quenched into 10% NaOH. The precipitation of crystallographically developing special carbides (V_4C_3 and Mo_2C) causes the secondary hardness on annealing at temperatures of 450-600° C. (N8a, J29; AY)

564-N.* (French.) Study of the Nucleation of Graphite and the Kinetics of Graphitization of Prehardened White Cast Irons. Pt. 1. Pierre Laurent and Michel Ferry. *Fonderie,* June 1958, p. 249-262.

Influence of number of nodules of graphite in starting material on speed of graphitization during isothermal and two-stage malleabilizing; influence of a tempering opera-

tion prior to malleabilizing treatment on nucleation of graphite and speed of graphitization.
(N2, N8s, J23b; CI-p)

565-N. (Polish.) **Effect of Vibrations, Transformation of Retained Austenite to Martensite.** E. Smihorski. *Prace Instytutaw Ministerstwa,* v. 6, no. 19, 1957, p. 30-33.

Effect of mechanical ultrasonic and magnetostrictive vibrations on the microstructure of quenched steel containing 1.48% C, 0.70% Mn, 0.35% Si and 1.30% Cr. A particularly marked effect on the change of microstructure was shown by vibrations connected with magnetostriction, the effectiveness of which was greater than that of tempering at 210° C. Magnetostrictive vibrations bring about a reduction in the amount of retained austenite, the transformation of tetragonal martensite to cubic, and breakdown of the martensite needles. (N8p, 1-74; AY)

566-N. (Rumanian.) **Cooling Curves of Cast Iron With Spheroidal Graphite.** L. Sofroni. *Studii si Cercetari Metalurgie,* v. 1, no. 2, 1956, p. 241-259.

Character of the cooling curves of gray cast iron with 3.27% C, 2.96% Si and 0.193% P, and of cast irons with spheroidal graphite with 3.20 and 3.35% C, 3.15 and 2.65% Si, 0.221 and 0.060% P and 0.074 and 0.94% Mg. Eutectic conversion in the spheroidal graphite cast iron takes place with greater supercooling and in a smaller interval of time than in gray cast iron. Increase of the Mg and P content causes an increase in the degree of supercooling on eutectic conversion but C and Si decrease it and increase the duration of eutectic conversion, because they accentuate the extent of graphitization in the process of hardening.
(N8s; CI-n, CI-r)

567-N. (Russian.) **Crystal Structure of the Metastable Phase Forming on Tempering Cu-Sn Alloys With 24-27% Sn.** Yu. A. Bagaryatskii. *Kristallografiya,* v. 2, no. 2, 1957, p. 283-286.

Taking into account the structural factor and the repeatability factor, relative line densities were calculated for the phase in Cu-Sn alloys with structure similar to the hexagonal zeta phase in Ag-Zn alloys, and a comparison made with the experimental findings of X-ray structural analysis. It is shown that the tempering phase (zeta-phase) in Cu-Sn alloys is isomorphous with the zeta-phase of Ag-Zn alloys. The law for the lattice transition beta→zeta is similar to that for the transition beta→omega in Ti alloys.
(N6p, J29; Cu-b, *Sn*)

568-N. (Russian.) **Hardening of Austenite During Reverse Martensite Transformation.** V. N. Gridnev, V. T. Cherepin and N. F. Chernenko. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 7-12.

An Fe-Ni-Mn alloy with 21.5% Ni, 2.86% Mn and 0.02% C, having an Ms temperature at about 10° and temperature of 470° C. for the beginning of the reverse martensite transformation, was studied to determine transformations at high rates of heating. Elongation, hardness, temperature, drop in voltage and current strength were measured. Heating was carried out at rates of 100-10,000° per sec. and the cyclic method of treatment was also used; soaking at −75° for 30 min., heating at 800° at a rate of 3000° per sec., and cooling in water. The magnitude of the volume effect during the reverse martensite transformation was the criterion of the stabilization of austenite. (N8p; AY)

569-N. (Russian.) **Some Rules for Direct and Reversed Martensitic Transformations.** E. L. Vinogradskaya and G. A. Kreslina. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 12-15.

Conversions in an Fe alloy with 0.06% C, 13.2% Mn, 0.28% Cu, 2.12% Co were studied by a magnetometric method on a special apparatus. The amount of alpha-phase was determined. Temperature at the beginning of the formation of martensite was 110-113° C. Heating from −194° at a rate of 3° per min. to 680°, soaking 5 min., cooling at a rate of 3° per min. to −194°, heating to room temperature, etc., showed that the alpha-gamma transition occurs at 350-650° and that in the second cooling about half as much martensite is formed in comparison with the first heating. The greatest stabilization of the gamma-phase is observed on heating after the first cycle up to 630° (N8p; AY)

570-N. (Russian.) **Strain Hardening, Recrystallization and Softening of Al-**

loyed Austenite. L. A. Metashop and M. E. Blanter. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 15-23.

Deformed specimens of an alloy steel with 1.0 to 1.2% C, 12% Mn, and additions of 0.98, 3.08 and 5.07% Cr were annealed at temperatures from ambient up to 1100° C., at intervals of 50-100° C. The processes of softening and recrystallization were assessed by measuring hardness and electrical resistance, as well as by metallographic examination and X-ray structural analyses. Softening of the austenite commences with a recovery process, and is completed at a low deformation degree (5%) only at the expense of the recovery process. Previous plastic deformation sharply lowers the temperature of the beginning of both the softening and recrystallization, and affects only slightly the end temperature of the softening process.
(N5, N7, 3-68; AY)

571-N. (Russian.) **Problem of the Nature of Martensitic Transformation.** M. E. Blanter and P. V. Novichkov. *Metallovedenie i Obrabotka Metallov,* no. 6, 1957, p. 11-14.

Changes in the condition of the retained austenite during martensitic transformation and the effect of these changes on its stability against forming further martensite particles. Specimens of steel with 1.21, 1.18 and 1.52% C and 2.04, 2.98 and 2.94% Mn respectively were heated to 860° C., cooled in oil and then, after various times, in the vapors from liquid O_2. The retained austenite content was determined on an anisometer. To obtain the characteristics of phase-work-hardening, a statistical method was used to measure the microhardness of the retained austenite. (N8p; AY, *Mn*)

572-N. (Russian.) **Effect of Vanadium on the Gamma→Alpha Transformation in Iron-Cobalt-Vanadium Alloys.** T. V. Krasnopevpeva and V. G. Livshits. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii. Institut Stali),* no. 15, 1956, p. 68-85.

Investigation of transformation during continuous cooling of gamma-phase and also during isothermal holding on alloys with 0, 2, 4, 5, 8, 10 and 12% V, at a constant Co content of 51%. Coercive force measured and microstructure alloys examined. As the V content was increased from 0 to 12%, the temperature corresponding to the start of gamma → alpha transformation changed from 925 to 525° C.
(N6, 2-60; Fe, Co, *V*)

573-N. (Russian.) **A Study of Transformation During Deformation of Iron - Cobalt - Vanadium Permanent Magnet Alloys.** G. V. Pshechenkova. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii. Institut Stali),* no. 15, 1956, p. 111-123.

Transformation processes leading to high magnetic properties in alloys containing 5-18% V and 50-52% Co. Changes in saturation magnetization measured with an Akulov anisometer; electrical resistivity, hardness, microhardness and microstructural examination; dilatometric and in some cases X-ray analyses. A section of the equilibrium diagram was constructed for alloys with 50% Co and 8-13% V. Alloys containing less than 12% V have a gamma-phase structure and do not undergo much change on heating and cooling. (N6p, P16; Fe, Co, V, SGA-n)

574-N. (Russian.) **Problem of the Gamma-Phase Stability in N29K Alloy at Subzero Temperatures.** M. I. Yudkevich and N. A. Solov'eva. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii, Institut Stali),* no. 15, 1955, p. 124-130.

Study of factors by which the gamma-alpha transformation can be brought down below −70° C. Specimens containing 26-32% Ni, 13-19% Co, 0.5-0.8% Cr and remainder Fe, were examined for the effect of alloy composition, cold work and heat treatment on the stability of gamma phase at temperatures below 0° C. Specific resistivity and coercive force were measured after annealing 1 hr. at 950° C. and after annealing and cooling for 2 hr. at −80° C. (N6p, 2-63; Ni, Fe)

575-N. (Russian.) **Recrystallization on Heating Eutectoid Aluminum Bronze.** G. N. Bogacheva and V. D. Sadovskii. *Trudnovoi Institut Fizicheskoi Metallurgii Ural Filial Akademii Nauk SSSR,* Series 17, 1956, p. 125-138.

Structural mechanism of recrystallization on heating specimens of Al bronze with 12.11% Al. The kinetics of the beta' beta-transformation on heating were examined dilatometrically on fully quenched samples. A comparatively rapid heating (200-300° C. per min.) does not lead to recrystallization, the grain showing great stability. The

phase transformation which starts, according to dilatometric curves, at 420° C., proceeds in the interior of the grains; this process of recrystallization is not accompanied by recrystallization of the solid beta-solution as involved by internal strain hardening on reverse transformation to "martensite". (N5; Cu-s, *Al*)

576-N. (Russian.) **Dilatometric and X-Ray Structural Analysis of Steels.** E. S. Tovpenets and G. N. Sin'kovskaya. *Trudy Donetskogo Industrialnogo Instituta,* v. 19, 1957, p. 59-64.

Effect of chemical composition, system of cooling and homogeneity of the steel on the decomposition of supercooled austenite in alloy construction steels containing C 0.32-0.42, Mn 0.40-0.72, Si 0.25-0.38, P 0.035, S 0.030-0.040, Cr 0.70-2.44, NiO 3.82, Mo 0-0.43, V 0-0.17 studied by dilatometric and X-ray structural analysis. The higher the alloy content, the lower is the temperature of beginning and end of decomposition of supercooled austenite. When degree of homogeneity of the steel decreases, the temperature of the end of decomposition of supercooled austenite is lowered to the region of lower temperatures. (N8; AY)

577-N. (Russian.) **Study of the Solubility of Carbides in Gamma Iron by Measuring the Width of the Diffraction Lines.** M. D. Perkas and A. E. Shamov. *Trudy Kuibeyshevskogo Inshener-Stroitelnogo Instituta,* Series 4, 1957, p. 177-183.

Investigations on low-carbon steel with 0.1% C, alloy steels with 6 to 11% Cr, 0.5% Ti, or 1.16% Cb, and on complex alloy steels with either 0.67% Ti and 5.7% Ni or 1.45% Cr and 0.83% V, or with 1.48% Mn and 1.4% V. To dissolve the carbides in the gamma phase, specimens were heated to 850-1300° C. and then quenched into a 10% aqueous solution of sodium hydroxide. X-ray diagrams were made in a back reflection camera with Cr-radiation. Relation between width of the diffraction lines and quenching temperature was obtained. (N8r, M22g; CN, AY)

578-N. (Russian.) **Low-Temperature Transformations in Austenitic Steels Used for Instrument Making.** F. A. Bogachev. *Trudy Leningradskogo Instituta Aviats ionnogo Priborostroeniya,* no. 22, 1957, p. 3-22.

Thermomagnetic and metallographic analysis used to study the effect of hot and cold plastic deformation, partial surface decarburization and isothermal holding at room temperature on martensitic transformation in thermomagnetic alloys (C 0.05-0.15%, Ni 30.8-37.0%, Mn 0.2-2.4%, Cr 10-12%), alloys with special thermal properties (C 0.05-0.30%, Ni 20.0-34%, Cr 2.3-2.8%, Co 5.7%) and thermo-bimetals (C to 0.36%, Ni 22.0-37.0%, Cr 2.0-3.0%). (N8p; AY, SGA-n, SGA-s, SGA-a)

579-N. (Russian.) **Investigation Into Diffusion of Sulphur in Nickel.** A. A. Presnyakov and L. M. Novikova. *Tsvetnye Metally,* no. 2, 1957, p. 73-76.

Ni was saturated with sulphur by heating specimens in different states (cast, deformed, etc.) to 400, 500, 600, 650, 700, 800 and 850° C. in a closed cast iron box, in which was placed 10 g. of S. Thickness of the layer of Ni affected by the S was determined by microanalysis. Diffusion of S is first noticeable at 500° C., the diffusion rate falling with increasing degree of preliminary deformation. (N1, 2-61; Ni, *S*)

580-N. The Self-Diffusion of Niobium. Pt. 2. R. Resnick, L. S. Castelman and L. Seigle. Sylvania Electric Products Inc. *U. S. Atomic Energy Commission, SEP-248,* June 30, 1958, 12 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Self-diffusion coefficient is measured as a function of temperature. Procedures have been developed for the preparation of $CbCl_5$ from a solution of radioactive Cb^{95} in oxalic acid, and the subsequent vapor plating of a radioactive metallic layer from this volatile compound. Values for the self-diffusion coefficient at 2000 and 1800° C. (N1d; Cb)

581-N. Survey of Ternary and Quaternary Metastable Gamma-Phase Uranium Alloys. Victor W. Storhok, Arthur A. Bauer and Ronald F. Dickerson. Battelle Memorial Institute. *U. S. Atomic Energy Commission, BMI-1278,* July 15, 1958, 36 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

Review of the effects of ternary and quaternary alloying on the stability and properties of U-Zr, U-Cb and U-Mo gamma-phase alloys. Effects of ternary and quaternary additions of Cr, Mo, Cb, Ru, V and Zr, on transformation kinetics, transformation temperature, hot

hardness and corrosion resistance. 4 ref. (M24, 2-60; U-b)

582-N.* (German.) **On the Practical Application of TTT-Diagrams for Continuous Cooling of Heat Treated Steels.** Hans Bühler and Franz Josef Schmidt. *Stahl und Eisen,* v. 78, May 15, 1958, p. 663-668.

Forged specimens of 400-mm. diameter from steel 38 MnSi4 and steel of about 0.5% C and 0.25% Mo studied regarding their cooling behavior from austenite point in water and oil. Precalculation of diagrams according to T. F. Russel and H. Bachmann permits a sufficiently accurate means of determining cooling characteristics for pieces up to 500 mm. diameter. 12 ref. (N8g; ST)

583-N. Distribution of Small Quantities of Carbon in Alloyed Iron. A. S. Zavyalov and B. I. Bruk. *Academy of Sciences of the USSR, Proceedings,* v. 115, 1957, p. 667-670. (Translation by Consultants Bureau, Inc.)

Nature of distribution of carbon in alloyed iron studied by autoradiography using C^{14}. 8 ref. (N1e, 1-59; Fe)

584-N.* (Russian.) **Rhenium Recrystallization Diagram.** E. M. Savitskii, M. A. Tylkina and K. B. Povarova. *Doklady Akademii Nauk SSSR,* v. 119, Mar. 11, 1958, p. 274-277.

Recrystallization temperature for cast Re is lower than for the metallo-ceramic Re. Re does not have tendencies to sudden grain growth even at annealing temperatures as high as 2000 to 2500°. Grain diameters deformed by various degrees of compression higher than critical do not exceed 15 to 20 microns for metallo-ceramic Re and 100 microns for cast. High hardening property of Re calls for frequent intermediate annealing during cold treatment. (N5, 2-64, M27c; Re)

585-N. (Russian.) **Recrystallization Texture in Low-Carbon Steel After Cold Rolling.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 331-338.

Magnetometric study. As the degree of deformation is increased, there are changes in both the type of recrystallization texture and the degreé of its perfection. For 90-95% deformation the first type of recrystallization texture, (001) [100] and (110) [001] is strongly developed. A second type of recrystallization texture is also present and becomes predominant on further increase of the degree of deformation. (N5, M26c; CN-g)

586-N. (Russian.) **Effect of Intermediate Annealing on Cold Rolling Texture and Recrystallization.** K. V. Grigorov and G. P. Blokhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 339-343.

Magnetometric study of effect of intermediate annealing at 800-1000° C. on the cold rolling texture and recrystallization of low-carbon and transformer steels. On cold rolling to high degrees of total deformation, with intermediate annealing, the texture formed is that characteristic of cold rolling to small degrees of deformation, without intermediate annealing. This indicates that it is possible to control the formation of cold rolling and recrystallization texture by selecting the number of intermediate anneals and degrees of deformation. (N5, M26c, 2-64; ST)

587-N.* Transformation Kinetics of Beta Plutonium. R. D. Nelson. *American Society for Metals. Transactions,* v. 51, Preprint no. 107, 1958, 6 p.

Transformation kinetics determined by a fluid displacement technique. Rate of formation of the alpha phase from the beta phase was determined after beta heat treating and allowing the sample to transform isothermally in the alpha range. Isothermal reaction curves were obtained from −78 to +90° C. A time-temperature-transformation curve showed the maximum rate of transformation to be approximately −20° C. A relationship between the fraction untransformed beta and the transformation temperature was established. 3 ref. (N6p, N7c; Pu)

588-N.* Recrystallization, Structure, and Hardness of Low Carbon Steels Containing up to 1% Copper. R. L. Rickett and W. C. Leslie. *American Society for Metals, Transactions,* v. 51, Preprint no. 108, 1958, 24 p.

Electron microscope and X-ray diffraction techniques were utilized in assessing effects of holding at 1100, 1200 and 1300° F. and Cu content on precipitation, hardness and lattice parameters of normalized Cu steels. Influence of recrystallization temperature, Cu content, cold

reduction and heat treatment prior to or following cold reduction on recrystallization rate, grain structure and hardness. Cu greatly retarded recrystallization and, in general, increased its hardness after annealing. Under proper conditions, comparatively coarse elongated ferrite grains were obtained in cold worked and annealed steels containing 0.4% or more Cu in which case the hardening effect of Cu was minimized. 6 ref. (N5, Q29n, 1-60; CN-g, *Cu*)

589-N.* **Solid State Diffusion and the Motion of Phase Boundaries.** David D. Van Horn. *American Society for Metals, Transactions*, v. 51, Preprint no. 116, 1958, 14 p.

Using the parabolic law for diffusion penetration versus time, the equations relating the motion of a phase boundary to the diffusion rates in a simple two-phase binary system are obtained. Nomographic methods for solving these equations are presented, and the behavior of various physical systems are analyzed. In cases where the parabolic law does not hold, the capabilities and limitations of various methods of analyzing the data are discussed. The influence of time dependent boundary conditions on the motion of phase boundaries is noted. Criteria for the design of experiments are given so that deviations from ideal behavior will be recognizable and the maximum physical significance may be obtained from the data. 19 ref. (N1b)

590-N.* (Russian.) **Changes in Some Properties of Steel No. EI612 and Its Dependence on the Degree of Austenite Decomposition.** V. I. Prosvirin and L. F. Chernov. *Metallovedenie i Obrabotka Metallov*, June, 1958, p. 10-14. (Henry Brutcher, Altadena, Calif., Translation no. 4246.)

This Cr-Ni steel containing W, Ti and Al was heat treated at different temperatures for various time intervals. Brittleness was produced at all temperatures after the first 1-2 hr. Intensive lowering of shock resistance resulting from heating at comparatively high temperatures is raised by longer treatment at 750° C. $Ni_3(AlTi)$ and TiC appear as secondary phases. The lower the temperature of austenite decomposition the more noticeable the changes in properties.
(N8, Q-general, 2-64; SS)

591-N.* (Russian.) **Sigma Phase in Austenitic Steel EI448.** E. I. Uryupina and A. F. Likina. *Metallovedenie i Obrabotka Metallov*, June, 1958, p. 37-41. (Henry Brutcher, Altadena, Calif., Translation no. 4252.)

Sigma phase can be detected by chemical analysis of electrolytic deposition of steel. Determination of Fe content yields data on the quantity of sigma phase in its structure. Sigma phase develops after 100-500 hr. aging at 800°. Development of sigma phase proceeds directly from austenite. The presence of sigma phase in steel does not lower time in testing for durability. (N8; SS)

592-N. **Metallography. Existence of a Plastic Deformation of Iron During the Alpha-Beta Transformation.** P. M. Lehr. *Comptes Rendus*, v. 244, no. 1, Jan. 2, 1957, p. 77-80. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1488.)

Previously abstracted from original. See item 128-N, 1957.
(N6p, Q24; Fe)

593-N. **Diffusion of Hydrogen Through Iron and Binary Iron-Chromium and Iron-Nickel Alloys at High Pressures and Temperatures** A. A. Scherbakova. *Zhurnal Prikladnoi Khimii*, June 1956, p. 955-960. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(N1e; Fe, Cr, Ni)

594-N. (Russian.) **Measurement of Diffusion Rates in Metals and Alloys.** A. Ya. Shinyaev. *Zavodskaya Laboratoriya*, v. 24, no. 8, 1958, p. 979-983.

Use of electrolytic polishing to determine diffusion coefficient in alloys having many components and phase states. Following electrolytic polishing the electrolyte is studied to determine concentration of radioactive atoms in the removed layers. 5 ref. (N1a, M20p)

595-N.* **Hydrogen Behaviour of Sheet Steel.** Gordon P. K. Chu. *Sheet Metal Industries*, v. 35, Aug. 1958, p. 585-588, 619.

An understanding of the chipping of glass on mild sheet steel, due to the precipitation of hydrogen, will lead to control of processes and products and avoiding troubles which have often been traced to hydrogen. Sources of hydrogen and mechanism of hydrogen absorption, diffusion and evolution. Chipping of coatings on mild steel is reduced by

using Ni or Cr alloys or coatings which slow down the rate of diffusion of hydrogen. 10 ref.
(N1, Q26s; ST, *H*)

596-N. (Russian.) **Investigation of Iron-Cobalt Alloys With High Magnetic Saturation.** G. V. Pshechenkova and T. V. Krasnopevtseva. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii Institut Stali)*, v. 15, 1956, p. 102-110.

Hardness, microstructure, critical points and magnetic properties of alloys containing 50% Co and 2% V. V substantially alters the critical points of alloys of the system Fe-Co, lowering the temperature of the alpha $\rightleftharpoons$ gamma change. The microstructure of slowly cooled alloys exhibits a characteristic network in the grains, which is probably associated with the phenomenon of order formation. The hardness of cold rolled specimens substantialy increases on heating up to 400-600°; with further temperature increase there is a decrease in hardness which is associated with the beginning of recrystallization.
(N6p, N5, P16; Fe, Co)

597-N.* (German.) **Structure and Properties of Extruded and Cold Drawn Strip From Al-Mg-Si Type Alloys. Effect of Manganese.** W. Rosenkranz. *Aluminium*, v. 34, Sept. 1958, p. 510-518.

Influence of different amounts of Mg and Si in the presence and absence of Mn. The Mn hinders recrystallization. In the presence of Mg_2Si, a larger amount of Mn is necessary to produce this effect. If a critical degree of stress, after deformation, is passed only moderately, Mn causes crystal growth in longitudinal direction, while with a greater deformation the concentration is balanced and crystal growth proceeds in all directions. 5 ref.
(N5, N3; Al-b, 4-53)

598-N. (Ukrainian.) **Relationship Between Chemical Composition and Alpha-Phase Content.** I. M. Fishman. *Naukovi Zapiski (Zaporiz'kii Derzhovnii Pedagogichnii Institut)*, v. 2, 1956, p. 79-82.

From tests on 400 casts of steel 1KH18N9T, an empirical formula was obtained by statistical analysis, giving the alpha-phase content for any actual steel composition within specification limits. Calculation was based on the multiple correlation method, assuming that Si, Cr and Ti increase the alpha-phase content, while C, Mn and Ni decrease it, to varying degrees. The formula obtained is as follows: alpha = − 10.47 C + 1.00 Si − 0.11 Mn + 0.50 Cr − 0.28 Ni + 1.63 Ti − 4.73. The over-all correlation coefficient is 0.434, showing that results are quite trustworthy. (N8, 2-60; AY, SS)

599-N. The Kinetics of Growth of Colloidal Cobalt Particles in Mercury. F. E. Luborsky. *Journal of Physical Chemistry*, v. 62, Sept. 1958, p. 1131-1132.

8 ref. (N2, N12; Co, Hg)

600-N. On the Acceleration of the Aging Process of Aluminum-Copper Alloys Under the Influence of Small Impurities of Silver or Zinc. V. I. Arkharov and N. N. Skornyakov. *Trudy Instituta Fiziki Metallov Akademiya Nauk SSSR, Uralskii Filial*, no. 16, 1955, p. 91-96. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4335.)

(N7, 3-69; Al, Cu, *Ag, Zn*)

601-N. Effect of Composition on the Ms and Decomposition Temperatures in Stainless Steels. F. C. Monkman, F. B. Cuff and N. J. Grant. Massachusetts Institute of Technology. *U. S. Office of Technical Services*, PB 125891, 18 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Martensite reaction is followed in simple 18-8 stainless steels by electrical resistivity. A linear equation is determined by the method of least squares relating the alloy composition and the temperature at which martensite is first observed to form during cooling. Decomposition of martensite at elevated temperatures investigated by electric resistivity measurements; decomposition products examined metallographically. (N8p, 2-60; SS)

602-N. Influence of Oxygen on the Transformation Characteristics of Some Titanium-Molybdenum Alloys. George L. Kehl and Alfred E. Riccardo. Columbia University School of Mines. *U. S. Office of Technical Services*, PB 125957, Oct. 1955, 83 p. (Available at Library of Congress, Washington, D. C.—Microfilm $4.80; Photostats $13.80.)

Influence of dissolved oxygen in the Ti-Mo alloys investigated was to shorten the time for initiation and completion of isothermal transformation and to raise the region of

rapid transformation of the T-T-T curve to higher temperature levels. (N7c; Ti-b, *Mo*)

603-N. Self-Diffusion in Germanium. Harry Letaw, Jr., W. M. Portnoy and L. Slifkin. Illinois Engineering Experiment Station. *U. S. Office of Technical Services,* PB 125958, May 1956, 15 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

In the temperature range 766-928° C., self-diffusion coefficient of Ge is represented by D-7.8 exp (−68,500/RT) sq. cm. per sec. The probable errors in the frequency factor and activation energy are ± 3.4 sq. cm. per sec. and ± 0.96 k. cal. per mol., respectively. (N1d; Ge)

604-N. Transformation in Disordered Gold Copper Alloys. G. C. Kuczynski, M. Doyama and M. E. Fine. Northwestern University. *U. S. Office of Technical Services,* PB 126302, Mar. 1956, 21 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Measurement of specific heat, temperature coefficient of expansion, Young's modulus and yield point in Cu_3Au alloys establishes a phase transition between 550 and 600° C. and possibly another one near 850° C. The temperature of the 550-600° C. transition decreases sharply as the composition of the alloy deviates from Cu_3Au. (N10a; Cu, Au)

605-N. Investigation of Beta Phase "Recrystallization" in Ti-3%Al-5% Cr Alloy. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131338, Nov. 1957, 22 p. $.75.

Possibility of controlling beta grain size during heat treatment of binary and ternary Ti alloys with Al and Cr, and effects on mechanical properties. Beta grain behavior was studied in the composition ranges of commercial MST Ti-3Al-5Cr alloy. A preliminary transformation temperature survey was made. (N5, M27c, 2-63; Ti-b, *Al, Cr*)

606-N. Research on the Effects of Stress, Strain, and Temperature on the Eutectoid Decomposition of Titanium Alloys. Adolph W. Goldstein, Arthur G. Metcalfe and William Rostoker. Armour Research Foundation. *U. S. Office of Technical Services,* PB 131610, Nov. 1957, 72 p. $2.

Three Ti-Cr alloys were forged in the alpha-beta range to give six systems with controlled amounts of each phase. The isothermal transformation at 400, 500 and 600° C. of each system was followed by resistivity, X-ray diffraction, elastic modulus measurements and metallography. Reactions occurring in the transformation were identified where possible. This transformation study was repeated under a stress which produced 1% creep in 1000 hr. An acceleration of four to seven times in the rate of transformation occurred under the action of this stress. (N9, N7c; Ti)

607-N.* (German.) **Structures Resulting From Precipitation of Cementite in Ferrite.** Wolfgang Pitsch and Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 485-488.

Investigations on the similarity in orientation of ferrite and cementite particles which have been precipitated from the ferrite. Direct electron microscope pictures of particles and electron diffraction pictures. Similarity in the atom structure suggests preference for $[111]_\alpha$ and $[010]_\alpha$ planes. 6 ref. (N8j; ST)

608-N.* (German.) **X-Ray Examination of Stacking Defects in Cold Formed Alpha-Iron.** Christian N. J. Wagner. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 489-493.

Chips from pure alpha iron were produced at room temperature under liquid nitrogen. Position and form of the intensity distribution diagrams of various Debye-Scherrer-lines were measured with filtered Co and Mo rays and with a Norelco diffractometer. A line spread was observed after cold deformation but no line shift. The particle spread is dependent on the crystallographic orientation and can be explained through stacking defects in the (211) planes of the lattice structure. 24 ref. (N8j; M22g; Fe)

609-N.* (German.) **Grain Size in the Hardening of Gold-Platinum Alloys.** H. Schmid. *Metall,* v. 12, July 1958, p. 612-619.

Gold-platinum alloys with 50 to 75% Au and 25 to 49% Pt tend to have strong grain segregation which increases up to 50% Pt and which is still in existence after 14th annealing at 1000° C. Rh additions have no effect on this phenomenon. Pt-rich alloys have finer grains than those with low Pt content. Grain

grows with increasing homogeneity of castings. Alloys between 30 and 50% Pt show better hardenability without Rh. Phase diagrams are given, and diagrams for strain, tensile strength, hardness as a function of annealing time and per cent Pt. 15 ref. (N3, J23; Au, Pt)

610-N.* (German.) **Structural Transformations of Austenitic Steels Subject to Long-Time Strain Tests.** Walter Koch, Angelica Schrader, Alfred Krisch and Helga Rohde. *Stahl und Eisen,* v. 78, Sept. 4, 1958, p. 1251-2162.

Four Cr-Ni steels, two of which were Cb-stabilized and one of which contained approx. 2% Mo, were subjected to long-time stress of 0 to 40 kg. per sq. mm. at 600-700° C., and up to 50,000 hr. Under these conditions, initially the MeC carbide of the stabilizing element was precipitated. Later the $Me_{23}C_6$ carbide was reduced again after a certain time and disappeared with the formation of the sigma phase. 15 ref. (N8, 3-68; AY)

611-N.* (Russian.) **Effect of Nitrogen on Austenite Grain Growth of Medium-Carbon High-Phosphorus Steel.** V. N. Svechnkov and I. Kh. Truzh. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 15-19. (Henry Brutcher, Altadena, Calif., Translation no. 4350.)

Combined effect of increased phosphorus-nitrogen content on grain size of medium carbon steel and changes occasioned by increased temperature. Tests conducted with bessemer rail steel (0.07% P). Results of metallographic study show that steels with 0.025% N show numerous clearly defined deformation lines in the ferrite. They are also present in steels with 0.006% N, but in considerably fewer numbers. Introduction of Al reduces number of these deformation lines. With 0.4% Al an agglomeration of these lines is noted. 13 ref. (N3, 2-60; CN)

612-N.* (Russian.) **Transformations During Heating of Quenched White Iron.** F. K. Tkachenko and V. F. Zubarev. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 24-26. (Henry Brutcher, Altadena, Calif., Translation no. 4352.)

Study made by simultaneous recording of thermal, dilatometric and magnetic curves during heating and cooling of specimens. Objects were heated with 800, 900, 950 and 1000° temperatures at 30-min. exposures. The magnetic transformation taking place in the ferrite of white iron goes below the Ac_1 point. At the second temperature levels the residual austenite is transformed into martensite and the magnetic transformation of carbides of unknown composition. (N8; CI-p)

613-N.* **Interaction of Dislocation With Atomic Order in Solid Solutions.** Koji Sumino. *Tohoku University, Science Reports of the Research Institutes,* v. 10, Aug. 1958, p. 283-298.

Interaction energy and locking force against the motion of the dislocation are calculated for the superlattice of a beta-brass type alloy; effect of thermal motion on the locking force. Interaction energy and locking force for an edge dislocation reveal a sharp peak at the Curie point of order-disorder transformation, while such a sharp peak is absent in a screw dislocation. (N10, M26b; Cu-b)

614-N.* **Diffusion of Calcium in Liquid Slags.** Tunezo Saito and Kazuo Maruya. *Tohoku University, Science Reports of the Research Institutes,* v. 10, Aug. 1958, p. 306-314.

Self-diffusion coefficients of Ca in molten slags (CaO-SiO_2, CaO-Al_2O_3, and CaO-SiO_2-Al_2O_3-MgO systems) were measured in the temperature range from 1350 to 1600° C. Diffusion coefficient has good correspondence to both the specific electric conductivity and the viscosity coefficient. Some behaviors of Al_2O_3 and MgO in basic slags. (N1d; RM-q, Ca)

615-N. Irradiation Induced Phase Changes in Uranium-Base Alloys. M. L. Bleiberg. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/619, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Kinetics of the phase reversal were studied by continuous measurements of the electrical resistivity of U alloy with 9% Mo while under pile-irradiation and at low temperatures. Changes in temperature coefficient of electrical resistivity were measured as a function of exposure. 10 ref. (N6p, 2-67; U-b, *Mo*)

616-N. Transformation Kinetics of Plutonium. R. D. Nelson and I. D. Thomas. Second United Nations International Conference on the

Peaceful Uses of Atomic Energy. A/CONF.15/P/1030, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Alpha → beta, beta → gamma and gamma → delta transformations in Pu studied by fluid displacement measurements. Heating and cooling curves, isothermal reaction curves showing the fraction transformed as a function of time, T-T-T curves, were obtained by this technique. (N6p; Pu)

617-N.* (French.) **Study of the Nucleation of Graphite and the Kinetics of Graphitization in Prehardened White Cast Irons. Pt. 2.** Pierre Laurent and Michel Ferry. *Fonderie,* no. 150, July 1958, p. 319-337.

Graphitization at temperature lower than that of eutectoid transformation point: number of particles of graphite obtained by isothermal treatment, speed of graphitization between 500 and 700° C., relationship between number of nuclei and speed of graphitization, variations in Vickers hardness during isothermal transformation, incubation period. Also, comparative study of kinetics of graphitization of hardened and nonhardened irons. (To be continued.) (N2, N8s; CI-p)

618-N.* (French.) **Iron Containing Diffused Graphite Produced by Annealing. Physicochemical and Metallographic Aspects.** J. Pomey. *Revue Universelle des Mines,* v. 14, 9th Series, Sept. 1958, p. 293-300.

Formation and evolution of transition carbides from martensite or bainite; epitaxic germination of graphite from hexagonal carbide; morphological and kinetic aspects of growth of graphite. Heat treatment of iron containing diffused graphite; mechanical properties of this iron. (N8s, J23: CI)

619-N.* (German.) **Strain Aging of Soft Iron Retarded by Phosphorus.** Friedrich Erdmann-Jesnitzer and Willi Dehnke. *Bergakademie,* v. 10, May-June 1958, p. 321-327.

Samples from melts with 0.02-0.07% C, 0.01% Si, 0.08-0.12% Mn, 0.006-0.073% P, 0.021-0.022% S, 0.013-0.014% N and 0.011-0.014% O were rolled and tested. Strain aging tendency studied by determination of elastic limit and increase of hardness after pre-straining and aging. Strain aging decreases within the range of 0.006 to 0.073% P. 15 ref. (N7e, 2-60; Fe, *P*)

620-N.* (German.) **Recrystallization of Magnesium in the Presence of Trace Elements.** Friedrich Erdmann-Jesnitzer and Ingrid Otto. *Bergakademie,* v. 10, May-June 1958, p. 328-333.

Experiments on the recrystallization temperature in relief annealing. Two Mg samples (with 0.08 wt % = 0.07 at. % and 0.44 wt. % = 0.40 at. % Al) and two other samples (with 0.08 wt. % = 0.035 at. % and 0.95 wt. % = 0.40 at. % Fe) were deformed by rolling and relief annealed. The recrystallization temperature was shifted to higher values by the added elements, especially by irons. 63 ref. (N5f, 2-60, 2-61, 2-64, 3-68; Mg-f, *Fe*)

621-N.* (Swedish.) **Strain Aging of High-Carbon Steels.** *Jernkontorets Annaler,* v. 142, no. 8, 1958, p. 515-535.

Mechanism governing improvement in elastic properties of high-carbon steels during annealing in the temperature range 150-300° C. Aging occurred in comparison with mild steel only after a considerable time delay, which increases with carbon content, particularly at more than 0.6-1.0% C. A suggested explanation of this delay is that those dislocations first to acquire a solute atmosphere would not have contributed to further slip, whether pinned or not. Solute pinning is considered to develop first at pile-up with large stress fields. 39 ref. (N7e, CN-r)

622-N.* (Russian.) **Polygonization of Cast Metals and Alloys.** B. A. Movchan. *Doklady Akademii Nauk SSSR,* v. 120, no. 3, 1958, p. 521-522.

Pure Cu and Ni test pieces vacuum cast and examined by microscope for structure changes. Micrographs of steels Kh25N20 and Kh8N13 and of the alloy Ni + 0.62 Cb. Structure change thought to be a consequence of boundary dislocations taking place in cooling. 5 ref. (N5; Cu, Ni, 5-60)

623-N.* (Russian.) **Influence of Small Additions on Diffusion Coefficients in Polycrystalline Metals. Pt. 2.** V. I. Arkharov, S. M. Klotsman and A. N. Timofeev. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 255-260.

Radiometric investigation of influence of 0.1% Be on intercrystalline diffusion of Ag in polycrystalline Cu. In alloys with Be the coefficient of intercrystalline diffusion of Ag is higher than in pure Cu. Hence, the volume of change of this coefficient is dependent on

the preliminary treatment of the alloy. Conclusions as to the adsorbtive activity of Be in Cu and dependence of the concentration of Be in intercrystalline transitional zones on temperature. 13 ref.
N1, 2-60, 2-61; Ag, *Be*, Cu)

624-N.* (Russian.) **Spheroidization of Graphite in Iron Treated With Magnesium.** A. Ya. Khronov. *Fizika Metallov i Metallovedenie*, v. 6, no. 2, 1958, p. 281-288.

The form of graphite in magnesium iron is closely related to the surface tension. The higher the surface tension the more compact the form of graphite. The decisive influence in the process of spheroidization of graphite is the supercooling of the iron. Studies were made on influence of addition of metallic Mg on surface tension of iron and form of precipitation of graphite. Iron was melted in Kryptol electric furnace with magnesite lining and capacity of 800 g. 31 ref.
(N8q; CI-r, *Mg*)

625-N. Growth and Definition of Bicrystals. R. Wegener and H. F. Matare. *Electrochemical Society*, Abstract no. 59, May 1957, p. 111-116.

Bicrystals used to study effect of grain boundaries on mechanical and electrical properties and diffusion in metals. (N3, N1)

626-N. Impurity Diffusion in Germanium and Silicon. M. Tanenbaum. *Electrochemical Society*, Abstract no. 60, May 1957, p. 120-125.

Solid state diffusion in semiconductors. 16 ref. (N1; Ge, Si)

627-N. Evaporation and Alloying of Metals to Silicon. J. M. Goldey, M. Tanenbaum and N. Holonyak, Jr. *Electrical Society*, Abstract no. 64, May 1957, p. 133-137.

Materials found useful as alloying agents are Al and Au-Sb (0.01-2% Sb). In the evaporation process the alloying agent arrives at the semiconductor in an atom by atom fashion, thus leading to intimate contact which is essential to uniform wetting.
(N16n, P15g; Si, *Au, Sb*)

628-N. Diffusion of Gallium in Silicon. *Journal of Applied Physics*, v. 29, Oct. 1958, p. 1456-1459.

Diffusion investigated over a temperature range of 1130-1358° C. using an open-tube vapor-solid diffusion technique at atmospheric pressure. 8 ref. (N1; Ga, Si)

629-N. Observations of Dislocations in Iron Whiskers. R. V. Coleman. *Journal of Applied Physics*, v. 29, Oct. 1958, p. 1487-1492.

Etching of iron whiskers in picral and nital etchants studied and etch-pit configurations in certain areas of as-grown whiskers observed. Dislocations introduced by plastic deformation of the whisker investigated and arrays of dislocations produced by annealing the deformed whiskers studied.
(N3r, M26b; Fe, 14-61)

630-N. Germanium Diffused Minicrystals and Their Use in Transistors. I. A. Lesk and R. E. Coffman. *Journal of Applied Physics*, v. 29, Oct. 1958, p. 1493-1494.

The diffused minicrystal process yields a Ge drift p-n-p bar-type transistor structure that has fewer practical limitations on emitter, base and collector resistivities and on base width, than other processes. 10 ref. (N3r, T1k; Ge)

631-N. Temperature Dependence of the Phase Transition in Cerium. R. Herman and C. A. Swenson. *Journal of Chemical Physics*, v. 29, Aug. 1958, p. 398-400.

The cubic-condensed cubic transition in Ce observed as a function of temperature and pressure from 360° K. and 11,000 atm. to 78° K. and zero pressure. (N11h, 2-61; Ce)

632-N. Diffusion of Indium in Tin Single Crystals. Anton Sawatzky. *Journal of Applied Physics*, v. 29, Sept. 1958, p. 1303-1305.

(N1a; In, Sn, 14-61)

633-N. Alloy Junctions in Semi-Conducting Devices. D. F. Taylor. *Research Applied in Industry*, v. 11, Sept. 1958, p. 335-338.

(N12; EG-j, Al, Si)

634-N. Diffusion of Silicon and Manganese in Liquid Iron. Pt. 1. Diffusion in Liquid Iron Saturated With Carbon. Tunezo Saito and Kazuo Maruya. *Tohoku University, Science Reports of the Research Institutes*, v. 10, June 1958, p. 259-268.

(N1; Fe, *Si, Mn*, 14-60)

635-N. Recovery and Recrystallization of Aluminum. Recent Investigations of Super-Purity and Commercial Purity Aluminum. D. Altenpohl. *Aluminium*, v. 33, May 1957, p. 306-317. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1329.)

Previously abstracted from original. See item 197-N, 1957.
(N5; Al-a)

636-N. Influence of Neutron Irradiation on Martensite Transformations. A. I. Zakharov and O. P. Maximova. *Doklady Akademii Nauk SSSR*, v. 114, 1957, p. 1195. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4067.)

(N8p, 2-67)

637-N. Relationships of the Diffusion and Lattice Reorganization Process During Decomposition of Solid Solutions. Y. A. Bagaryatskii and Y. D. Tyapkin. *Doklady Akademii Nauk SSSR*, v. 115, 1957, 6 p. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4008.)

(N1c, M27b)

638-N. Use of X-Ray Goniometric Methods for Determination of the Mutual Orientation of Phases. Pt. 3. X-Ray Study of the Aging of Aluminum Alloys. Y. A. Bagaryatskii. *Fizika Metallov i Metallovedenie*, v. 1, no. 2, 1955, p. 316-329. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB33.)

Previously abstracted from original. See item 189-N, 1956.
(N7, M23c; Al, *Cu, Mg*)

639-N. Ordering Mechanism of an Ni_2Mn Alloy With Different Molybdenum Additions. B. G. Lifshits, B. V. Molotilov, N. N. Muller and N. A. Savost'ianova. *Fizika Metallov i Metallovedenie*, v. 3, 1956, p. 477-485. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4249.)

(N10, 2-60; Ni, *Mn, Mo*)

640-N. Study of Diffusion of Carbon in Nickel and Its Alloys Using the Radioactive Isotope C^{14}. P. L. Gruzin, Y. A. Polikarpov and G. B. Fedorov. *Fizika Metallov i Metallovedenie*, v. 4, 1957, p. 94-102. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4269.)

Previously abstracted from original. See item 385-N, 1957.
(N1, 1-59; Ni, *C*)

641-N. Dynamics of the Solidification of Castings. I. D. Semikin and E. M. Gol'dfarb. *Liteinoe Proizvodstvo*, no. 2, 1956, p. 16-22. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4464.)

(N12, E25n)

642-N. Analytical Solutions of Elementary Problems in the Solidification of Castings of Various Shapes. N. G. Girshovich and Y. A. Nekhendzi. *Liteinoe Proizvodstvo*, no. 3, 1956, p. 14-19. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4462.)

Previously abstracted from original. See item 244-N, 1956.
(N12, E25n)

643-N. Effect of Pressure Upon Void Formation in Diffusion Couples. R. S. Barnes and D. J. Mazey. *Acta Metallurgica*, v. 6, Jan. 1958, p. 1-7.

Sandwiches of Cu and Ni diffused under hydrostatic pressure to eliminate voids. Likewise, voids formed during annealing in vacuum are eliminated by pressure during a subsequent heat treatment. 9 ref.
(N1a; 3-74, Cu, Ni)

644-N. Self-Diffusion in Dilute Binary Solid Solutions. Pt. 3. Diffusion in Silver-Germanium and Silver-Thallium Solutions. R. E. Hoffman. *Acta Metallurgica*, v. 6, Feb. 1958, p. 95-97.

Diffusivity of Ag in Ag-Tl solution of Tl and Ge in Ag solutions. Data agree with model for diffusion in dilute solutions. 8 ref.
(N1e; Ag-b, *Ge, Tl*, 14-67)

645-N. Growth of Whiskers in the Solid Phase. J. Franks. *Acta Metallurgica*, v. 6, Feb. 1958, p. 103-109.

Growth of whiskers from clamped tin plate studied. Properties of growth in vacuum, and at temperatures up to 215° C. Theoretical model to explain growth developed. 22 ref. (N3r; Sn, 2-61, 14-61)

646-N. X-Ray Measurements of Short-Range Order in Beta AgZn. E. Suoninen and B. E. Warren. *Acta Metallurgica*, v. 6, Mar. 1958, p. 172-175.

Using a single crystal of beta AgZn at 330° C., measurements of diffuse scattering made. 11 ref.
(N10a, M26q; Ag, *Zn*, 14-61)

647-N. Factors Affecting the Alpha-Beta Phase Boundaries of Zirconium and Titanium Alloys. J. O. Betterton, Jr., and J. H. Frye, Jr. *Acta Metallurgica*, v. 6, Mar. 1958, p. 205-211.

Variation of phase boundaries can be reduced to an approximate common behavior in terms of electron

concentration. Thermodynamic relations given. 17 ref. (N6p; Zr, Ti)

648-N. Mode and Morphology of Massive Transformations in Cu-Ga, Cu-Zn, Cu-Zn-Ga and Cu-Ga-Ge Alloys. T. M. Massalski. *Acta Metallurgica,* v. 6, Apr. 1958, p. 243-253.

In extreme cases massive phases form by a very rapid growth of inherent grain boundaries, and possess no crystallographic relationship with respect to the parent phase. In less extreme cases partially coherent nucleation, resembling martensitic nucleation, is probably taking place. 25 ref. (N-general; Cu-b, Ga, Zn, Ge)

649-N. Simple Treatment of Ordering Kinetics. A. S. Nowick and L. R. Weisberg. *Acta Metallurgica,* v. 6, Apr. 1958, p. 260-265.

Differential equation, derived by Dienes from chemical rate theory is simplified into a second-order differential equation whose solutions are hyperbolic functions. 9 ref. (N10b)

650-N. Ordering Kinetics in Long-Range Ordered Cu_3Au. R. Feder, M. Mooney and A. S. Nowick. *Acta Metallurgica,* v. 6, Apr. 1958, p. 266-277.

Kinetics of the change of order in a partly long-range ordered Cu_3Au alloy when the temperature is varied below the critical temperature. 23 ref. (N10b; Cu-b, Au)

651-N. Lattice Parameter and Short-Range Order. G. T. Dienes. *Acta Metallurgica,* v. 6, Apr. 1958, p. 278-282.

12 ref. (N10b)

652-N. Grain Growth in Zone-Refined Lead. G. F. Bolling and W. C. Weingard. *Acta Metallurgica,* v. 6, Apr. 1958, p. 283-287.

A single growth law was observed whose departure from a simple $t^{1/2}$ relation could be explained on the basis of an inclusion-type hypothesis following Burke. 13 ref. (N3, 2-60; Pb)

653-N. Some Effects of Impurities on Grain Growth in Zone-Refined Lead. G. F. Bolling and W. C. Weingard. *Acta Metallurgica,* v. 6, Apr. 1958, p. 288-292.

In general, grain growth was retarded to an increasing extent from Sn to Ag to Au but the rates of grain growth at any time approached a common value near the melting point for all the purities investigated. 4 ref. (N3, 3-69; Pb)

654-N. Structural Changes in Single Crystal Copper-Alpha Brass Diffusion Couples. V. Y. Doo and R. W. Balluffi. *Acta Metallurgica,* v. 6, June 1958, p. 428-438.

Changes associated with Kirkendall diffusion include dislocations; arrangement of dislocations into subboundaries; recrystallization; twinning. Effect of temperature. 18 ref. (N1a, M26b, Cu, Cu-b, 2-61)

655-N. An X-Ray Examination of the Epsilon Phase in TiV, TiMo and TiCr Alloys. J. M. Silcock. *Acta Metallurgica,* v. 6, July 1958, p. 481-493.

Alloys of Ti with 16% V, 13% Mo or 13% Cr, all from an epsilon phase of same structure. This phase can be reverted and retarded by cold work. Cold work also accelerates formation of alpha phase. 15 ref. (N6p; Ti, *V, Mo,* Cr, 3-68)

656-N. Slow Strain-Hardening of Ingot Iron. A. W. Sleeswyk. *Acta Metallurgica,* v. 6, Sept. 1958, p. 598-603.

Strain-hardening characteristics of Armco ingot iron during slow plastic deformation under tension. The serrated stress-strain curves often observed with this type of material are a consequence of the anomalous velocity dependence of strain-hardening. A modification is proposed of the Nabarro theory of blue brittleness. 20 ref. (N7e, Q24, Q25n, 3-68; Fe-a)

657-N. Diffusion of Carbon and Oxygen in Vanadium. *Acta Metallurgica,* v. 6, Oct. 1958, p. 643-646.

Carbon diffuses faster than oxygen. Solutions of C in V are unstable, however, due to precipitation of VC. 10 ref. (N1a; V, *C, O*)

658-N. Precipitation of Silicon Out of a Supersaturated Aluminum-Silicon Solid Solution. H. S. Rosenbaum and D. Turnbill. *Acta Metallurgica,* v. 6, Oct. 1958, p. 653-659.

Precipitation of Si from Al (1% Si) solid solution strongly dependent on previous heat treatments. 12 ref. (N7b, 2-64, 3-70; Al, Si, 14-67)

659-N. Role of Dislocations in Carbide Precipitation in Alpha-Iron. R. H. Doremus. *Acta Metallurgica,* v. 6, Nov. 1958, p. 675-679.

Under increased strain, rate of precipitation of carbon from alpha-iron increased. Concluded that car-

bon precipitation occurs by nucleation of carbide particles on dislocations. 18 ref. (N7b; Fe, C, 3-68)

660-N. Martensitic Transformations and Determination of the Inhomogeneous Deformation. D. S. Lieberman. *Acta Metallurgica,* v. 6, Nov. 1958, p. 680-693.

Simple, graphical method for determining, directly from observations of crystallographic features of a martensite transformation, the inhomogeneous deformation. 25 ref. (N8p, Q24)

661-N. Liquid Immiscibility in Copper-Iron and Copper-Cobalt Systems in the Supercooled State. Y. Nakagawa. *Acta Metallurgica,* v. 6, Nov. 1958, p. 704-711.

Liquid immiscibility found only in super-cooled state. Results related to thermodynamics of the liquid solutions. 10 ref.
(N12, P12; Cu, Fe, Co)

662-N. A Transitional h.c.p. Phase in the Gamma→Alpha Transformation in Certain Fe-Base Alloys. B. Cina. *Acta Metallurgica,* v. 6, Dec. 1958, p. 748-762.

The h.c.p. sigma phase in Fe-Mn alloys is also present in Fe-Ni-Cr with over 24% Ni + Cr, but not in Fe-Ni system. 17 ref.
(N6p; Fe, Mn, Ni, Cr)

663-N. The Free Energy of Formation and the Interfacial Enthalpy in Pearlite. J. J. Kramer, G. M. Pound and R. F. Mehl. *Acta Metallurgica,* v. 6, Dec. 1958, p. 763-771.

Enthalpy of pearlite-austenite transformation as a function of pearlite spacing in Fe-C and Cu-Al eutectoids. 26 ref.
(N8h, N9, P12; Fe-b, *C,* Cu-b, *Al*)

664-N. Kinetics of Reaction of Steel With Hydrogen Sulfide-Hydrogen Mixtures. Andrew Dravnieks and Carl H. Samans. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 183-191.

Reaction at 250-500° C. Observed kinetics explained by adsorption, rate of formation of diffusing species and diffusion. 29 ref.
(N15, N1; ST, *S, H*)

665-N. Equilibria Between Titanium Metal and Solutions of Titanium Dichloride in Fused Magnesium Chloride. K. Komarek and P. Herasymenko. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 210-215.

Method developed for collecting vapors over solid $TiCl_2$ or over mixtures of $TiCl_2$ and $MgCl_2$ in a specially designed Ti pipette at high temperatures. 5 ref.
(N12r, 1-66; Ti, Mg-b, Cl)

666-N. Diffusion of Third Elements in Liquid Iron Saturated With Carbon. R. E. Grace and G. Derge. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 331-337.

Diffusion coefficients of Ni, Si, Ti, Mn, P and Si measured by the capillary reservoir technique at 1190-1450° C. 12 ref. (N1, 1-66; Fe-b, *C, Ni, S, Ti, Mn, P, Si,* 14-60)

667-N. Grain Boundary Sliding and Migration in High Purity Aluminum at Room Temperature. F. B. Cuff, Jr., and N. J. Grant. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 355-356.

Fine network produced on surface of chemically polished Al is a means for observing small strains.
(N3, 3-68; Al-a)

668-N. Molecular Diffusion and Interphase Transfer in the Solid Copper-Molten Lead System. J. W. Gorman and G. W. Preckshot. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 367-373.

Coefficients for diffusion of Cu independent of composition. No resistance to transfer across solid-liquid interface. 29 ref. (N1h, M24b)

669-N. Shock Induced Martensitic Transformation. R. E. Ceck and D. Turnbull. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 395-397.

Supercooled Fe-Ni alloy exhibits mechanical shock sensitivity. Transformation is maximum at −140 to −160° C. 6 ref. (N8p, 2-63; Fe-b, Ni)

670-N. Marker Movement in K-Rb Interdiffusion. Ling Yang, M. T. Simnad and R. F. Mehl. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 412-413.

Rb diffuses faster than K and ring mechanism of diffusion is not dominant one operating.
(N1c; Rb, K, 14-68)

671-N. Solid State Diffusion With a Linearly Varying Temperature. H. L. Armstrong. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 450-451.

(N1a)

672-N. Spheroidization of Cold Worked Pearlite. A. H. Holtzman, J. C. Danko and R. D. Stout. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 475-476.

AISI 1080 steel studied by lineal analysis. (N8q, N8h, 3-68; ST)

673-N. Effects of Composition on Transformations in Titanium-Chromium Alloys. H. I. Aaronson, W. B. Triplett and G. M. Andes. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 624-626.

12 ref. (N-general; Ti-b, *Cr*)

674-N. Self-Diffusion of Silver in Molten Silver. Ling Yang, Satoshi Kado and G. Derge. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 628-630.

8 ref. (N1d; Ag, 14-60)

675-N. Redistribution of a Second Phase During Annealing in a Temperature Gradient. P. G. Shewman. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 642-647.

If a two-phase alloy is annealed in a temperature gradient, there is a tendency for the piece to be enriched in one phase at the hot or cold end of the piece. 20 ref. (N-general, 2-64; Cn-g, T-b, *H,* NM-a37)

676-N. Eutectic Solidification Structures. H. W. Weart and D. J. Mack. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 664-670.

In eutectic solidification, a subgrain structure, the colony substructure, was observed in the eutectics between Al + Zn, Sn + Zn and Al + $CuAl_2$. This structure is the result of a cellular solid-liquid interface topograph whose presence accounts for the phase arrangement within the colonies. 15 ref. (N12q, M28h; Al-b, Zn, Sn-b, Cu, 14-68)

677-N. Zirconium and Hafnium Phases Isostructural With Ti and Ni. M. V. Nevitt and L. H. Schwartz. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 700-702.

Zr in combination with Rh, Ir or Pt; Hf in combination with Rh, Pd, Ir and Pt. 8 ref. (N-general; Zr-b, Hf-b, Rh, Ir, Pt, Pd, 14-68)

678-N. Contribution to Theory of Inverse Segregation. J. S. Kurkaldy and W. V. Youdelis. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 833-840.

On basis of volume contraction and interdendritic flow, mechanism of inverse segregation, concentration distribution in unidirectionally cooled ingot of binary constitution calculated. 12 ref. (N12, 9-69; 5-59)

679-N. Ternary Diffusion in Alpha Copper-Tin-Zinc. F. N. Rhines, R. A. Meussner and R. T. DeHoff. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 860-862.

Composition versus distance from interface examined. (N1, M24c; Cu-b, *Sn, Zn*)

680-N. Transformation Kinetics of Two Titanium Alloys in the Transition Phase Region. S. A. Spachner and W. Rostoker. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 765-769.

Temperatures and time which govern existence and nature of stable and metastable structures. 5 ref. (N-general; Ti-b, *Cr, Mo*)

681-N. Secondary Recrystallization in Silicon Iron. John E. May and David Turnbull. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 769-781.

Presence of impurities needed for strong texture and secondary recrystallization to develop. Analysis of combined effects of inclusions and texture on driving energy of recrystallization. 30 ref. (N5h, M26c, 3-69; Fe-b, *Si*)

682-N. Effect of Pressure on the Diffusion of Zinc in Alpha Brass. A. G. Guy and Carmine Spinelli. *Welding Journal,* v. 37, Nov. 1958, p. 524s-525s.

10 ref. (N1e, K2k, 3-74; Cu-n, *Zn*)

SECTION P

PHYSICAL PROPERTIES and TEST METHODS

1-P. Irradiation Effects in Uranium and Its Alloys. S. H. Paine and J. H. Kittel. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 107-117.

Dimensional changes are a major problem. Various theories advanced of fundamental mechanism; correlation of growth phenomenon with fabrication and structural variables such as composition, rolling temperature, roll pass design, reduction in area, heat treatment, texture and grain size. 7 ref. (P10d, 2-67; U)

2-P. Specific Heats of Liquid Metals and Liquid Salts. T. B. Douglas. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 191-199.

General method of measuring and important sources of error; specific heats of mixtures in relationship to those of their components. (P12r; 14-60)

3-P. Influence of Impurities on the Magnetic Properties of High-Purity 3% Silicon Iron. D. A. Leak and G. M. Leak. *Iron and Steel Institute, Journal,* v. 187, Nov. 1957, p. 190-194.

Variation of static hysteresis and coercive force with nitrogen and carbon content for material slowly cooled from a high temperature. 18 ref. (P16, 3-69; Fe, *Si*)

4-P. On the Magnetic Properties of Cubic Cerium. Tsuyoshi Murao and Takeo Matsubara. *Progress of Theoretical Physics,* v. 18, Sept. 1957, p. 215-222. (CMA)

The magnetic susceptibility and specific heat of the cubic form of Ce calculated in terms of the level splitting of the electronic state due to the crystalline and exchange field. The data help explain the anomalous behavior of Ce at low temperatures. 17 ref. (P16, P12r, 2-63; Ce)

5-P. Experimental Determination of the Radiation Decomposition of Boron-10. W. K. McCarty. Atomics International. *U. S. Atomic Energy Commission,* NAA-SR-1999, Oct. 15, 1957, 32 p.

Tests with aluminum capsules containing metal specimens and boron 10-enriched boron trifluoride. (P18h, 1-54; B)

6-P. Dimensional Stability of Uranium-Chromium Alloys. M. C. Fraser, G. A. Last and S. H. Bush. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission,* HW-50624, June 6, 1957, 19 p.

Chromium level, orientation, mechanical, physical properties in relation to irradiation-induced dimensional instability. 4 ref. (P10d, 2-67; U, Cr)

7-P. (German.) Conductivity and Hall-Constant. Pt. 1. Nickel-Chromium Alloys. Werner Köster and Peter Rocholl. *Zeitschrift für Metallkunde,* v. 48, Sept. 1957, p. 485-495.

Resistivity, Hall constant, thermoelectric power, magnetic susceptibility, Vickers hardness and Young's modulus of some Ni-Cr alloys between 10 and 37 at. % Cr have been measured. Electron exchange and therefore electrical conductivity are determined by grouping of atoms. 20 ref. (P15g, P15p; Ni, *Cr*)

8-P. (German.) Electrical Resistivity of Molten Metals. Pt. 3. Electrical Resistivity of Molten Alloys of the Solid Solution Forming Systems Silver-Gold and Copper-Gold and the Eutectic Systems Silver-Copper, Tin-Zinc and Aluminum-Zinc. Albert Roll and Hasso Motz. *Zeitschrift für Metallkunde,* v. 48, Sept. 1957, p. 495-502.

Resistivity studied as a function of composition and temperature by eddy current method. Resistance anomalies were found in the five systems. No theory has been proposed to explain them. 24 ref. (P15g, 2-60; Ag, Au, Cu, Sn, Zn, Al)

9-P. (German.) **Solutions and Oxides in the System Tantalum-Oxygen.** E. Gebhardt and H. D. Seghezzi. *Zeitschrift für Metallkunde,* v. 48, Sept. 1957, p. 503-508.

Investigation at temperatures between 800 and 1500° C. and at oxygen pressures between 10^{-3} and 2.10^{-2} Torr; kinetics of forming solutions and oxides; maximum solubility of oxygen in the equilibrium state with Ta_2O. 14 ref. (P12; Ta, *O*)

10-P. Electronic Structure of Semi-Conducting Selenium and Tellurium. R. Gaspar. *Acta Physica,* v. 7, no. 3, 1957, p. 289-311.

By taking the lattice structure of the crystal and the electronic structure of the atoms into account the energy band spectrum of semiconducting Se and Te is determined, a main characteristic of which is that the valence and conduction bands are composite. Both the valence and the conduction bands are superpositions of two bands. In one of the overlapping bands the mobility of charge carriers is small while in the other it is great. Some qualitative indication of the relative positions of the overlapping bands is given. Callen's electronic structure scheme is analyzed in detail. 9 ref. (P15, M25, M26; Se, Te)

11-P. Theoretical Interpretation of the Optical and Electrical Properties of Tellurium, Selenium and Their Alloys. R. Gaspar. *Acta Physica,* v. 7, no. 3, 1957, p. 314-324.

Interpretation of the dependence of the infrared absorption spectrum of Te on the polarization of incident radiation, the soft X-ray absorption spectrum of Se and Te, the anisotropy of electrical conductivity and the anomalous variation of the Hall coefficient of Te with temperature. 12 ref. (P15, P17e; Te, Se)

12-P. Heat Capacity of Terbium From 15 to 350° K. L. D. Jennings, R. M. Stanton and F. H. Spedding. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 909-913. (CMA)

7 ref. (P12r; Tb)

13-P. (German.) **Electrical Properties of Metal Spray Coatings.** K. Sagel. *Metalloberfläche,* v. 11, Aug. 1957, p. 255-257.

Electrical properties in relation to base material, spraying distance, burner adjustment, subsequent mechanical and thermal treatments. Specific resistance of coatings of various thicknesses and compositions. 18 ref. (P15, L23)

14-P. (Polish.) **Testing Electromagnetic Plates.** J. Kurilowicz. *Hutnik,* v. 24, July-Aug. 1957, p. 323-328.

Basic testing of transformer steel plates in d-c. and a-c. magnetic fields. 9 ref. (P16; SGA-r, AY)

15-P. (Polish.) **Magnetic Sound and Its Application in Ferromagnetic Testing.** A. Stryk. *Hutnik,* v. 24, July-Aug. 1957, p. 328-332.

Principle and application of "F" sound in measurement of coercive tension, magnetic anisotropy and discontinuity of materials. 7 ref. (P16, 1-54)

16-P. (Russian.) **Theory of Electron Emission in Ferromagnetic Materials Caused by Electrostatic Field.** A. Z. Veksler. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 222-227.

Computation of electron emission in ferromagnetic materials; relationship between density of the electron stream and spontaneous magnetization of the metal. 5 ref. (P15k; SGA-n)

17-P. (Russian.) **Electric and Magnetic Properties of Intermetallic Compound CdSb.** I. M. Pilat. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 232-238.

Electric and magnetic properties in relation to surplus of cadmium or antimony and admixtures of Al, Te, Pb and Sn. Analysis of the results applying the theory of crystal bonding forces. 11 ref. (P15, P16, 2-60; Cd, Sb)

18-P. (Russian.) **Influence of Elastic Strain and Heat Treatment Upon Magnetic Properties of Certain Tough Magnetic Materials.** M. G. Luzhinskaya and Ya. S. Shur. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 239-244.

Influence of elastic stretching, torsion and heat treatment upon magnetic properties of the alloys: 8% V, 52% Co, 40% Fe; 14% V, 52% Co, 30% Fe; and 15% Mn, 85% Fe. Application of unilateral tensile stresses to the alloys on annealing produces changes in their magnetic properties and structure. 5 ref. (P16, 2-64, 3-68; SGA-n)

19-P. (Russian.) **Certain Magnetic Properties of Dispersion-Hardening Alloys: Iron-Molybdenum and Copper-Nickel-Iron.** V. I. Ivanovskii. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 245-248.

Kinetics of coercive force change of Fe-Mo (18% Mo) alloy at temperature of solid solution decomposition. Coercive force and magnetic density of Fe-Ni-Cu alloy as function of temperature. Kinetics of magnetic density change of Fe-Ni-Cu alloy on dispersion hardening process. 3 ref.
(P16, Fe, Mo, Cu, Ni, SGA-n)

20-P. (Russian.) **Coercive Force of Cold Formed and Annealed Iron Alloys.** G. M. Fedash. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 257-266.

Relationship between coercive force and concentration of upgrading elements. Influence of cold, plastic deformation and annealing temperature upon coercive force of iron alloys. 7 ref. (P16; Fe)

21-P. (Russian.) **Magnetic Effect of $I_s(t°)$ Curves Obtained From Tempered and Deformed Patterns in Temperature Interval of 260-270° C.** B. A. Apaev. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 267-277.

Variation of magnetic properties on tempering of hardened steel and on deformation of annealed steel. Discussion of the bend on magnetization curves around 260-270° C. 20 ref. (P16, 2-64; ST)

22-P. (Russian.) **Investigation of Heat Transfer of Self-Aligning Alloys Under Conditions of Stationary Thermal Equilibrium.** G. E. Zolotukhin. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 352-359.

Experimental determination of heat transfer of Au-Cu and Pt-Cu alloys in respect to annealing time below the critical temperature. 7 ref. (P11k; Au, Pt, Cu)

23-P. (Russian.) **Magnico-Type Alloys With Reduced Cobalt Content.** L. M. Garmash, A. M. Morozova and M. S. Yanskaya. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 8-10.

Reducing the Co from 24 to 21% does not require the use of higher magnetic poles in thermomagnetic treatment. (P16; SGA-n, Co)

24-P. Freezing Points of High Purity Metals as Precision Temperature Standards. Pt. 2. Investigation of the Freezing Temperatures of Zinc, Cadmium and Tin. E. H. McLaren. *Canadian Journal of Physics,* v. 35, Sept. 1957, p. 1086-1105.

An investigation with Pt resistance thermometry. Plateaus of essentially constant ($<\pm 0.0001°$ C.) temperature with durations of over 1 hr. are readily obtained on the cooling curves of these metals. For series of freezes on particular samples, the standard deviations of the respective plateau temperatures were of the order of $\pm 0.0002°$ C. Pressure effects on the freezing temperatures were 0.0043° C., 0.0062° C., and 0.0033° C. per atmosphere for Zn, Cd and Sn; respectively. Thermal analysis of these high-purity metals reveals structures and other features associated with nucleation, coring and annealing phenomena; typical thermal curves are shown. 14 ref. (P12n; Zn, Cd, Sn)

25-P.* **Reaction of Hydrogen With Preoxidized Zircaloy—2 at 300 to 400° C.** Earl A. Gulbransen and Kenneth F. Andrew. *Electrochemical Society, Journal,* v. 104, Dec. 1957, p. 709-712.

The permeability of preformed oxide films to hydrogen at 300-400° C. was studied. Two types of reactions were observed. If the oxide film was permeable, a general reaction occurred with the formation of zirconium hydride phases on the surface. If the oxide film was relatively impermeable, reaction occurred at the edges of the sample where defects probably exist in the oxide. 7 ref. (P10m, N15d; Zr, *O*)

26-P. A Metallurgist's View of Metallurgy. Earle E. Schumacher. *Metallurgia,* v. 56, Sept. 1957, p. 129-133.

Research and progress in understanding solid state including plastic flow, atomic scale defects, magnetic properties and low-temperature phenomena.
(P general, N general, Q general)

27-P. Low-Temperature Galvanomagnetic Effects in Bismuth Monocrystals. R. A. Connell and J. A. Marcus. *Physical Review,* v. 107, Second Series, Aug. 15, 1957, p. 940-946.

Measurements of the Hall coefficient and magnetoresistance have been made on Bi monocrystals at liquid He temperatures in range from 3 to 16 kilogauss for all principal crystallographic orienta-

tions. Two complete sets of oriented crystals were used, one set grown from unpurified Bi, the other from zone-refined Bi. Pronounced de Haas-van Alphen type oscillations were observed with same periods for both galvanomagnetic effects. For a given orientation of magnetic field with respect to crystal axes, periods were in good agreement with the values found in de Haas-van Alphen effect and were independent of current direction. Impurities were found to have little effect on the period but a large effect on the amplitude of oscillations and on monotonic component of both magnetoresistance and Hall effect. 16 ref. (P16, 2-63; Bi, 14-61)

28-P. De Haas-van Alphen Oscillations in the Thermal and Electrical Magnetoresistance of Tin. Perry B. Alers. *Physical Review,* v. 107, Aug. 15, 1957, p. 959-960.

Oscillatory behavior of the de Haas-van Alphen type has been found in both the electrical and thermal magnetoresistance of an Sn single crystal at liquid He temperatures. Measurements were made in magnetic fields ranging from 22 to 25 kilogauss. Tetragonal axis of the crystal was parallel to the field and perpendicular to rod axis. Thermal and electrical oscillations were in phase and yielded values in substantial agreement with that deduced by Shoenberg from diamagnetic susceptibility requirements. 5 ref. (P16; Sn, 14-61)

29-P. Oscillatory Galvanomagnetic Properties of Bismuth Single Crystals in Longitudinal Magnetic Fields. Julius Babiskin. *Physical Review,* v. 107, Second Series, Aug. 15, 1957, p. 981-992.

Galvanomagnetic effects of oriented single crystals of Bi have been studied in longitudinal magnetic fields up to 60,000 gauss at liquid helium temperatures. Oscillatory behaviors with de Hass-van Alphen periodicity were discovered to be superimposed upon the normal galvanomagnetic effects. 48 ref. (P16; Bi, 14-61)

30-P. Processes Occurring During the Heat Treatment of Alcomax. A. G. Clegg and M. McCaig. *Physical Society Proceedings,* Section B, v. 70, Sept. 1, 1957, p. 817-822.

The permanent magnet alloy Alcomax has been investigated after different heat treatments using two techniques. Curves of saturation intensity against temperature have been obtained using a Sucksmith balance, and curves of coercivity against temperature by extraction from a solenoid. It is concluded that maxima in the coercivity curves are associated with subsidiary Curie points. Reversible changes in room temperature coercivity produced between 600 and 700° C. are also associated with the appearance and disappearance of subsidiary Curie points. 12 ref. (P16d, 2-64; Al)

31-P. Unusual Magnetic Properties of Quenched Alcomax III. M. McCaig. *Physical Society Proceedings,* Section B, v. 70, Sept. 1, 1957, p. 823-826.

If the permanent magnet alloy Alcomax III is quenched from a high temperature instead of the usual treatment it has the properties of a rather unusual soft magnetic material. The permeability is almost constant up to flux densities over 5000 gauss and the ratio of remanence to saturation intensity is less than 0.1. Details of these properties and their theoretical implications. 3 ref. (P16d, 2-64; Al)

32-P. Temperature Coefficient of Reflectivity of Nickel. L. Ward. *Physical Society Proceedings,* Section B, v. 70, Sept. 1, 1957, p. 862-866.

The variation with temperature of reflecting power of Ni has been measured by null method at five wavelengths in the near infrared region of the spectrum. Results are in satisfactory agreement with those calculated from previous work on emissivity. There was no conclusive evidence for significant change in reflectivity at the Curie point. (P17f; Ni)

33-P. Secondary Electron Emission From Nickel and Molybdenum at Low Primary Electron Energies. A. R. Shulman and E. I. Miaakinin. *Soviet Physics-Technical Physics,* v. 1, no. 10, 1957, p. 2157-2166. (CMA) (Translated by American Institute of Physics.)

3 ref. (P15k; Ni, Mo)

34-P. (Russian.) **Hall Effect in Titanium-Molybdenum Alloys.** N. V. Grum-Brzhimailo and V. G. Gromova. *Zhurnal Neorganicheskoi Khimii,* v. 2, Oct. 1957, p. 2426-2428. (CMA)

3 ref. (P15p; Ti, Mo)

35-P.* Thermodynamics of the Ta-O System: The Dissociation Energies of TaO and TaO_2. Mark G. Inghram, William A. Chupka and Joseph Berkowitz. *Journal of Chemical Physics,* v. 27, Aug. 1957, p. 569-571.

Mass spectrometric analysis of the vapor in thermodynamic equilibrium with mixtures of Ta (s) and Ta_2O_5 (s) has shown TaO and TaO_2 to be the predominant gaseous molecules present. The experimental data yield 8.4 ± 0.5 ev. and 15.0 ± 0.5 ev. for the energies of atomization of these molecules at 0° K. 18 ref. (P12; Ta, *O*)

36-P. Is Cobalt Harmful in Stainless Steel? Joseph R. Lane. *Metal Progress,* v. 72, Dec. 1957, p. 86-87.

In certain nuclear applications where neutron absorption converts the element into Co-60, stainless steels containing Co could become dangerous radiation sources. (P18h, 2-60; SS, Co, 2-67)

37-P* An Investigation Into the Effect of Magnetic Domains in Cobalt on an Electron Beam. M. Blackman and E. Grunbaum. *Royal Society Proceedings, Series A, Mathematical and Physical Sciences,* v. 241, Sept. 10, 1957, p. 508-521.

The effect on an electron beam of the leakage field due to the magnetic domains in an unmagnetized crystal of hexagonal Co has been investigated. A conventional electron-diffraction camera was used, the primary beam being limited by a small movable aperture and the deflexions observed on a photographic plate. Both the hexagonal and prism faces were examined. Magnetic effects were found (a) on the primary beam, (b) on the diffraction pattern, (c) on the shadow edge of the diffraction pattern, and (d) on the shadow photograph of the crystal produced by diffuse scattering from the edge of the aperture. These effects are analyzed in terms of the fields produced by the magnetic domains; measurements are made of the size of the domains and of the magnitude of the leakage field at the surface and its variation with the distance from the surface. 10 ref. (P16c; Co)

38-P. Effect of Radiation on the Thermal Conductivity of Uranium—1.6% Zirconium. H. W. Deem, et al. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-986, Mar. 16, 1955, 15 p. (CMA)

(P11b, 2-67; U, Zr)

39-P. Electrochemistry of Zirconium. R. E. Meyer. Oak Ridge National Laboratory. *U. S. Atomic Energy Commission,* ORNL-2386, Oct. 28, 1957, p. 114-116. (CMA)

The open-circuit potential time and the d-c. polarizabilities were measured in H_2SO_4. The exact behavior was dependent on surface treatment, temperature and composition of the solution. Zr forms oxide layers when anodized. Generalities are offered on the model of a Zr electrode. (P15; Zr)

40-P. Porosity in Formed Titianium. R. A. Wood, et al. Battelle Memorial Institute, Titanium Metallurgical Laboratory, Report 72. *U. S. Office of Technical Services,* PB 121628, May 1957, 42 p. (CMA)

Surface pitting and internal voids are formed in areas of Ti parts which have been highly strained. This kind of porosity may be affected by the deformation temperature, amount of strain, the strain rate, state of stress, and amount and kind of impurity. (P10m; Ti)

41-P. Physical Properties of Titanium and Titanium Alloys. W. J. Lepkowski and J. W. Holladay. Battelle Memorial Institute, Titanium Metallurgical Laboratory, Report 39. *U. S. Office of Technical Services,* PB 121629, July 1957, 87 p. (CMA)

(P general; Ti)

42-P. (German.) Effect of Dislocation on Ferromagnetism of Nickel. Martin Kersten. *Annalen der Physik,* v. 20, no. 1-6, 1957, p. 337-338.

(P16; Ni)

43-P. (German.) Magnetic Susceptibility of Liquid Selenium and Tellurium. G. Busch and O. Vogt. *Helvetica Physica Acta,* v. 30, Aug. 1957, p. 224-227.

(P16; Se, Te)

44-P. (German.) Anisotropy of Thermal Expansion in Iron-Nickel Alloys. Pt. 1. Gerhard Papke. *Zeitschrift für Physikalische Chemie,* v. 207, June 1957, p. 91-110.

Expansion on rolling of Fe-Ni sheets. 15 ref. (P11g, F23; Fe, Ni)

45-P.* (Italian.) Study of the Electrochemical Behavior of Metal Monocrystals. Pt. 2. Roberto Piontelli, Guido Poli and Lucia Paganini. *Istituto Lombardo de Scienze e Lettere, Rendiconti,* v. 91, no. 11, 1957, p. 355-370.

Anodic and cathodic over-voltages of Cu and Ag single crystal electrodes; active surface oriented following (111) and (100) investigated at 25° C. with different solutions

and current densities. The structural changes involved studied by electron diffraction, and by micrography. 9 ref. (P15)

46-P.* (Italian.) **Study of the Electrochemical Behavior of Metal Monocrystals. Pt. 3.** Roberto Piontelli, Ugo Bertocci and Claudio Tamplenizza. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. 11, 1957, p. 378-385.

Hydrogen over-voltages, in H_2SO_4 0.1 *N*, at 25, 40 and 55° C., on electrodes of Cu single crystals, in the shape of disks, whose active surface was oriented following (111), (110), (100), and on Cu polycrystalline electrodes. Tafel law holds true. The parameters are coincident for all of the investigated electrodes. 10 ref. (P15; Cu)

47-P.* (Italian.) **Study of Electrochemical Behavior of Thallium.** Ugo Bertocci and Sergio Ticozzi. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. 11, 1957, p. 386-396.

Measurements of the anodic and cathodic overvoltage of Tl at 25 and 40° C. in various solutions. Results coincided with those previously reported as "normal" behavior for Tl, even in hydrate solutions which had not previously been studied. 5 ref. (P15; Tl)

48-P. (English.) **Activity of Manganese and Carbon in Iron-Carbon-Manganese Melts.** Masayasu Ohtani. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 426-433.

Activities were determined by measuring the e.m.f. corresponding to the change in Mn and C content at 1540° C. in an electrode concentration cell. 10 ref. (P12b, 2-60; Fe, *C, Mn*)

49-P. (Italian.) **Research on the Electrochemical Behavior of Polycrystalline Zinc.** Ugo Bertocci. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. 1, 1957, p. 40-54.

Measurements were taken of anodic and cathodic overvoltage of Zn in zinc chloride, sulphate and perchlorate solutions, and influence of acidity, temperature and current density was studied. Overvoltage increases in the following order of solutions: chloride, sulphate, perchlorate. Voltage-current curves are almost symmetrical in relation to equilibrium value of zinc electrode. 19 ref. (P15; Zn)

50-P. (Italian.) **Research on the Electrochemical Behavior of Silver.** Guido Poli. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. 1, 1957, p. 258-270.

Via oscillographic recording of voltage-time curves for very brief rectangular current impulses, anodic and cathodic behavior of Ag in perchlorate, nitrate and sulphamate solutions is studied. Influence of anion and of Ag salt and acid concentrations in solutions on maximum polarizations and initial polarization capacities. Activating effect of sulphamic and nitric anions and of hydrogen ions was confirmed. Overvoltage of Ag is interpreted as due to process of crystallization. 15 ref. (P15; Ag)

51-P. (Russian.) **Conditions of Deformation Influencing the Physical Properties of Alloy VD17.** M. Ya. Kuleshov, N. P. Petrov and V. I. Vlasov. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 33-39.

Samples of a heat resisting alloy widely used for vanes in aviation motor compressors were deformed in a 700-ton press under differing conditions. The physical characteristics remained within the technical requirements; however, elongation per unit length was almost two times greater than specified. (P general, P10d, Q24; SGA-h)

52-P. (Russian.) **Perfection of Simultaneous Determination of Heat Transfer and Conductivity of Steel.** R. E. Krzhyzhanovskii. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 925-927.

(P11h, P11k; ST)

53-P. (Russian.) **Simplified Determination of Steel Heat Transfer Coefficient.** L. A. Brovkin. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 929-931.

(P11k; ST)

54-P. (Russian.) **Investigation of Interphase Tension.** S. I. Rempel and L. V. Yureva. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 934-936.

Method of interface tension measurement between liquid phase of light metals and slag. (P13h; RM-q, EG-a39)

55-P.* **Predicting the Thermodynamic Stabilities and Oxidation Resistances of Silicide Cermets.** Alan W. Searcy. *American Ceramic Society, Journal,* v. 40, Dec. 1, 1957, p. 431-435.

Available information is used to demonstrate the calculation of the

stability of silicide-metal mixtures. The cause of the outstanding oxidation resistance of certain silicides is analyzed, and the results are used to predict high oxidation resistance for several untested disilicides. Thermodynamic and structural arguments are applied to the prediction of compositions of thermodynamically stable and oxidation resistant cermets. 14 ref. (P12; 6-70)

56-P.* Elastic Properties and Specific Heats of Solids. Carl W. Garland. *Chemical Education,* v. 34, Dec. 1957, p. 597-600.

Theory of lattice heat of crystalline solids; method of calculating heat capacity at constant volume from knowledge of frequency spectrum of normal modes of lattice vibrations; role played by elastic properties of solids in determining this frequency spectrum. All with reference to ideal macrocrystalline case. 21 ref. (P12r, Q21)

57-P. Testing and Examination of Electrodeposits. Pt. 5. Porosity Tests. R. Quarendon. *Product Finishing (London),* v. 10, Nov. 1957, p. 70-82, 132.

56 ref. (P10m, 1-54; 8-62)

58-P. Dynamic Magnetostrictive Properties of Alfenol. C. M. Davis, Jr., and S. F. Ferebee. U. S. Naval Ordnance Laboratory. *U. S. Office of Technical Services,* PB 131168, Oct. 1955, 33 p. $1.

(P16b, T1g; Al, Fe)

59-P. Effects of Temperature on Magnetic Properties of Core Materials. M. Pasnak. U. S. Naval Ordnance Laboratory. *U. S. Office of Technical Services,* PB 131130, May 1956, 36 p. $1.

(P16, T1g, 2-63)

60-P. Effect of Nuclear Irradiation on Magnetic Properties of Core Materials. R. S. Sery, R. E. Fischell and D. I. Gordon. U. S. Naval Ordnance Laboratory. *U. S. Office of Technical Services,* PB 131014, Dec. 1956, 45 p. $1.25.

(P16, T1g, 2-67)

61-P. Apparatus for Measuring Surface Tension and Density of Liquid Metals in Vacuum. N. L. Pokrovskii and M. Saidov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 546-551. (Henry Brutcher Translation no. 4011, Altadena, Calif.)

Previously abstracted from original. See item 447-P, 1956.
(P10a, P13h; Sn)

62-P.* (Spanish.) Influence of the Gaseous Phase on Cation Exchange in the Silver-Cupric Sulphate System. F. Barreira and Maria del Carmen Brinquis. *Real Sociedad Espanola de Fisica y Quimica, Anales, Serie B, Quimica,* v. 411-B, Sept-Oct. 1957, p. 663-666.

Similar results were obtained for metallic Ag in 5*N* solution of cupric sulphate, both in presence of air and of argon. Conclusion is that, for case studied, presence of oxygen is not necessary to achievement of ion exchange between metal and electrolyte. 12 ref. (P15; Ag)

63-P.* Viscosity of Lead, Tin and Their Alloys. W. R. D. Jones and J. B. Davies. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 164-166.

Viscosity varies in accordance with the equilibrium diagram, a marked change being found at the limit of solid solubility and a minimum at the eutectic. Small additions of Sn increase appreciably the viscosity of Pb. 9 ref. (P10f, 2-60; Pb, Sn)

64-P. Nickel Alloys for Controlled Thermal Expansion. E. M. Wise. *Product Engineering,* v. 28, Oct. 28, 1957, p. 68-71.

Composition of some common Ni alloys and data on thermal expansion coefficient. (P11g; Ni)

65-P.* (Italian.) Influence of Various Elements on the Resonance of Aluminum. T. Federighi. *Alluminio,* v. 26, Oct. 1957, p. 422-425.

Greatest increases were caused by Cu and Mg, intermediate by Si and Mn, least by Zn and Ag.
(P18m, 2-60; Al, *Cu, Mg, Si, Mn, Zn, Ag*)

66-P.* (Italian.) Thermodynamics of Liquid Metallic Systems Having Two Components. L. Riccoboni, L. Oleari and M. Fiorani. *Metallurgia Italiana,* v. 49, Oct. 1957, p. 725-744.

Experimental methods of detemining activity of components of a liquid metallic system; special attention to method based on chemical equilibria; contribution of thermodynamic research to understanding of metallic systems. 108 ref.
(P12b, M24b)

67-P. (Russian.) Certain Peculiarities of Electrical Resistance of Nickel-Chromium Alloys. S. D. Gertsriken and A. V. Prograshchenko. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 505-510.

4 ref. (P15g; Cr, Ni)

68-P. (Russian.) **Thermal Deformation of Machine Tools.** Y. N. Sokolov. *Stanki i Instrument,* v. 28, Oct. 1957, p. 12-15.

(P11g, T6n)

69-P.* **Control of Oxygen in Sodium Heat Transfer Systems.** I. L. Gray, R. L. Neal and B. G. Voorhees. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 11-18.

Plugging indicators used on Na and NaK flowing systems to determine oxygen concentration from 3 to 300 ppm. with accuracies of greater than 0.001% oxygen. Cold traps containing wire mesh packing successfully reduced oxygen content of Na system to values less than 10 ppm. and operated on system whose initial oxygen content was supersaturated in excess of 800° F. 8 ref. (P11k, 1-53; Na, *O,* 14-60)

70-P.* **Thermal Conductivity of Metals.** C. T. Ewing, B. E. Walker, J. A. Grand and R. R. Miller. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 19-24.

Develops a general thermal conductivity equation for metals based on the concept of electronic and molecular conduction; its application in the prediction of thermal conductivity values, degree of correlation for 140 metals and alloys over wide temperature ranges. Equation valid for both liquid and solid metals. 33 ref. (P11h, 14-60)

71-P.* **Pool-Boiling Heat Transfer With Mercury.** C. F. Bonilla, J. S. Busch, Arnold Stalder, N. S. Shaikhmahmud and Arcot Ramachandran. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 51-57.

Nature of boiling and necessary temperature differential observed for Hg boiled on horizontal low-carbon steel plate at pressures from 4 to 2300 mm. of mercury absolute, at depths of 2 to 10 cm. and heat velocities of 4000 to 200,000 Btu. per hr. per sq. ft. with and without the addition of wetting agents. 13 ref. (P11k; ST, Hg, 14-60)

72-P. Adsorption and Diffusion of Hydrogen on Nickel. R. Wortman, R. Gomer and R. Lundy. *Journal of Chemical Physics,* v. 27, Nov. 1957, p. 1099-1107.

13 ref. (P13d, N1h; *H,* Ni)

73-P.* **Misfit Strain Energy in the Au-Cu System.** Ralph Hultgren. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1240-1243.

Misfit strain energy calculated for the tetragonal gold-copper superlattice from interatomic distances and Morse functions. Electronic re-arrangement occurs during uni-axial tension reducing the strain energy. Application and discussion of Pauling's theory on electronic re-arrangements. 16 ref. (P12, N10; Au, Cu)

74-P.* **Application of Radioactive Tracers to Surface Studies.** R. W. Cahn. *Institute of Metal Finishing, Bulletin,* v. 7, Autumn 1957, p. 1-12.

Preparation and decay properties of radioactive isotopes and methods used for locating and measuring radiation. Application and some results obtained with tracers in studying exchange of ions between metal and a solution containing the same or other metal ions; adsorption of a gas on a metal, mechanism of passivation in corrosion studies, electroplating and metal transfer in friction. 26 ref. (P18h, 1-59)

75-P. How to Take Advantage of Magnetic Core Materials. J. A. Roberts, A. Schmeckenbecker and G. Ludwig. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 153-159.

Permeability and core losses are factors to be considered in selecting magnetic materials for high-frequency inductance coils. 5 ref.
(P16, T1m, 17-57; SGA-n, Fe, 6-72)

76-P. Magnetic Cores in Miniature Electronic Circuits. David M. Hodgin. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 160-167.

Problems and applications of ferrite materials in electronic components.
(P16, T1c, 17-57; SGA-n, Fe, 6-72)

77-P. Characteristics and Present Requirements of Ferrites. R. D. Harrington. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 177-188.

General properties of ferrites and their application to electronic devices. 23 ref.
(P16, T1, 17-57; Fe, 6-72)

78-P. Latest Developments in Magnetic Storage and Switching Applications. James W. Schallerer. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 189-195.

The present and future expansion for uses of square hysteresis loop ferrite materials. 4 ref.
(P16, T1d, 17-57; SGA-n, Fe, 6-72)

79-P. Thermal Expansion of Ferrites at Temperatures Near the Curie Point. W. R. Buessem and A. Dorf. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 196-204.

5 ref. (P11g, P16; SGA-n, Fe, 6-72)

80-P. Heat Capacity of Cu_3Au Below 4.2° K. John A. Rayne. *Physical Review,* v. 108, Nov. 1, 1957, p. 650-651.

13 ref. (P12r, 2-63; Cu, Au)

81-P. Soft X-Ray Absorption by Thin Films of Vanadium. Bipin K. Agarwal and M. Parker Givens. *Physical Review,* v. 108, Nov. 1, 1957, p. 658-659.

7 ref. (P17c; V)

82-P. Resistivity of Interstitials in Copper. R. J. Potter and D. L. Dexter. *Physical Review,* v. 108, Nov. 1, 1957, p. 677-682.

14 ref. (P15g; Cu)

83-P. Magnetic Susceptibility of Germanium. Raymond Bowers. *Physical Review,* v. 108, Nov. 1, 1957, p. 683-689.

(P16; Ge)

84-P.* Electric Resistivity of the Ni-Pd Alloy System Between 300 and 730° K. A. I. Schindler, R. J. Smith and E. I. Salkovitz. *Physical Review,* v. 108, Nov. 15, 1957, p. 921-923.

The maximum in resistivity was found to shift from 70 at.% Pd, 30 at.% Ni at room temperature, to 50-50 composition at temperatures where all specimens are paramagnetic. At these elevated temperatures Matthiessen's rule is obeyed over the entire range of compositions. General behavior may be interpreted in terms of dependence of s-d scattering upon temperature and composition. 5 ref.
(P15g 2-61; Ni, Pd)

85-P. Studies on the Magnetic Anisotropy Induced by Cold Rolling of Ferromagnetic Crystal. Pt. 1. Iron-Nickel Alloys. Soshin Chikazumi, Kenzo Suzuki and Hiroko Iwata. *Physical Society of Japan, Journal,* v. 12, Nov. 1957, p. 1259-1276.

11 ref. (P16, 3-68; Fe, Ni)

86-P.* Lattice and Electronic Specific Heats of Copper and Silver. K. G. Ramanathan and T. M. Srinivasan. *Scientific and Industrial Research, Journal,* v. 16B, July 1957, p. 277-279.

Variation of atomic heats of Cu and Ag were investigated in the liquid helium range of temperature and results compared with those of other researchers. 10 ref. (P12r; Cu, Ag)

87-P.* Cold Rolling of Extra-Hard Carbon Steel and Its Influence on Heat Treatments Involving Quenching. M. Massin. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 847-857.

Apparatus and technique based on thermal analysis for the determination of internal or latent energy produced by cold rolling strip. Observation on high-carbon cold rolled steel with thermal analysis as a function of time. Study of the variation of latent energy liberated before and after alpha-gamma transformation and its relation to cold rolling conditions and extent of work hardening. (To be concluded.) 8 ref. (P12a, F23, 1-54; CN, 4-53)

88-P. Porosity in Formed Titanium. R. A. Wood, D. N. Williams, H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121628, May 1957, 42 p. $1.25.

A new type of material failure called "strain-induced porosity" has been found in parts formed of commercial-purity Ti. The phenomena were marked by surface pitting and internal voids formed in areas of the part which had been highly strained. (P10m, 3-68; Ti, 9-68)

89-P. Physical Properties of Titanium and Titanium Alloys. W. J. Lepkowski and J. W. Holladay. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121629, July 1957, 87 p. $2.25.

(P general; Ti)

90-P. (French.) **Nonmagnetic Cast Iron.** Zbigniew Tyszko. *Fonderie,* v. 140, Sept. 1957, p. 411-421.

Theoretical point of view. Magnetic properties of a cast iron depend upon the structure of its metallic matrix. Ni and Mn, by opening the alpha loop, decrease the Curie temperature of the steel and make it possible to get stable austenite. Industrial importance of nonmagnetic cast iron. The iron is alloyed with either Ni and Mn or with Mn only. The best quality is obtained with Fe-Mn and Fe-Al systems. 10 ref. (P16, 2-60; CI-q, Ni, *Mn, Al*)

91-P. (German.) **Heat Transfer of Welded and Soldered Joints.** H. Komossa. *Kaltetechnik,* v. 9, Sept. 1957, p. 279-281.

Heat conductivity of welded and soldered joints corresponds to that of the parent material. 10 ref. (P11k, 7-51, 7-52)

92-P. (German.) **Electrical Resistance and Supraconductivity of Vapor Deposited Gallium.** Friedhold Baumann.

Nachrichten der Akademie der Wissenschaften in Gottingen. IIa. Mathematisch-Physikalisch-Chemische Abteilung, no. 15, 1956, p. 285-295.

12 ref. (P15; Ga, 8-72)

93-P. (German.) **Generalized Method for Treatment of Transport Phenomena in Metals and Semiconductors.** Dieter Dorn. *Zeitschrift für Naturforschung,* v. 12a, Sept. 1957, p. 739-749.

14 ref. (P15, EG-j)

94-P. (German.) **Theory of Ferromagnetism. Pt. 2. The Heisenberg-Model.** Klaus Meyer. *Zeitschrift für Naturforschung,* v. 12a, Oct. 1957, p. 797-804.

12 ref. (P16)

95-P. (Russian.) **Analysis of Magnetic Structure.** S. V. Vonsovskii and M. N. Mikheev. *Zadovskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1221-1226.

53 ref. (P16)

96-P. (Czech.) **Measurements of Relative Mobility of Cations in Three Component Silicate Fluid Solutions.** V. I. Malkin. *Hutnické Listy,* v. 12, Nov. 1957, p. 985-989.

Measurement of the cation transmission number serves as an index of metallurgical reaction kinetics particularly in molten slag reactions. 9 ref.
(P12; RM-q, Si, Na, K, Ca)

97-P.* (German.) **Electrical Conductivity of Aluminum.** K. R. Vassel. *Aluminium,* v. 33, Dec. 1957, p. 781-782.

Aluminum for conduction of electricity requires special measures in producing and semifinishing and in adherence to specifications. Twenty-five elements were studied for their action on conductivity. They can be divided into two groups differing in electron structures. D-elements having fully filled or no d-shell increase the atomic resistance. 9 ref.
(P15g, 2-60; Al)

98-P. (Russian.) **Influence of Technological Factors Upon Magnetic Properties of Cold Rolled Transformer Steel.** M. M. Ioffe, A. G. Petrenko and G. F. Chub. *Stal',* v. 17, Oct. 1957, p. 936-940.

Relationship between Si and carbon contents, treatment of the liquid steel under vacuum, annealing temperature under vacuum, magnetic properties of the transformer steel. 3 ref. (P16, 2-60, 1-73; ST, SGA-r)

99-P.* **Work Function of the (110) Face of a Tungsten Single Crystal and Positive Surface Ionization of Sodium on This Face.** G. N. Shuppe, E. P. Sytaia and R. M. Kadyrov. *Academy of Sciences of the USSR, Bulletin, Physical Series,* v. 20, no. 10, p. 1035-1043. (Columbia Technical Translations.)

23 ref. (P15; W, 14-61)

100-P. **Metals for the Nuclear Age. Pt. 2. Beryllium.** *Columbia-Southern Chemicals,* v. 2, no. 3, Fall, 1957, p. 9-11.

Nuclear properties; extraction of Be; potential applications outside nuclear energy field.
(P18, C general; 17-57; Be)

101-P.* **Viscosity of Lead, Tin and Their Alloys.** W. R. D. Jones and J. B. Davies. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 164-166.

The decrease of viscosity with increase of temperature is uniform, and the relationship between viscosity and temperature is that expected from Andrade's equation, except near the freezing point, where there is a deviation and viscosity increases rapidly. There are marked changes in the slope of the viscosity-composition curves at alloy contents corresponding to changes in constitution. 9 ref. (P10f; Pb, Sn)

102-P.* **Electron Irradiation of Copper Near 10° K.** J. W. Corbett, J. M. Denney, M. D. Fiske and R. M. Walker. *Physical Review,* v. 108, Nov. 15, 1957, p. 954-964.

The resistivity change induced by electron irradiation of zone-refined Cu maintained at ~10° K. has been measured over the range of bombarding electron energies from 0.70 to 1.37 Mev. The cross section for damage production is shown to be insensitive to the choice of the shape of the displacement probability function for this energy range. Isochronal and isothermal annealing studies of irradiations performed at 1.37 Mev. are described. The isothermal annealing curves are not amenable to analysis in terms of a single simple rate process, but seem to require a multiplicity of processes. 24 ref. (P15g, P18j, 2-67; Cu)

103-P.* **Differential Cross Section for 3.8 Mev. Neutrons Scattered From Zirconium and Molybdenum.** H. S. Hans and S. C. Snowdon. *Physical Review,* v. 108, Nov. 15, 1957, p. 1028-1031.

The differential cross sections for the scattering of 3.7-Mev. neutrons from Zr and Mo have been measured

in a ring geometry by using a Bonner-type scintillation detector. The measurements were taken over an angular range of 124° between 18° and 142°. Angular resolution effects have been removed by iteration. Multiple scattering effects have been removed by a Monte Carlo-type calculation. 12 ref.
(P18j, 2-67; Zr, Mo)

104-P.* Precise Measurements of the Density of Mercury at 20° C. Pt. 1. Absolute Displacement Method. A. H. Cook and N. W. B. Stone. *Royal Society of London, Philosophical Transactions,* v. 250, Nov. 28, 1957, p. 279-323.

Measurement of density in units of length and mass probably correct to one ppm. Densities of four samples of Hg were measured by finding mass of Hg displaced by an accurately formed cube of tungsten carbide sintered with Co. 38 ref.
(P10a; Hg)

105-P.* Accomplishments and Limitations of Solid-State Theory. Harvey Brooks. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 44-81.

Success of solid-state theory in explaining in qualitative and quantitative terms the physical properties of solids. 40 ref.
(P general, M general, N general)

106-P. Surface Phenomena. Robert Gomer. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 216-266.

Review of surface structure, friction, adhesion, adsorption, catalysis, corrosion and electron emission. 38 ref. (P13, P15k, R general, Q9p)

107-P. Theoretical Basis of Magnetic Phenomena. J. E. Goldman. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 267-301.

17 ref. (P16)

108-P. Physics of Magnetic Materials. R. M. Bozorth. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 302-335.

Physics of ferromagnetic Fe-Si alloys, Fe-Ni alloys and nonmetallic ferrites. Structure of atoms and interatomic forces that cause ferromagnetism, antiferromagnetism and ferrimagnetism. 33 ref. (P16, M25)

109-P. Physics of Semiconductors. K. Lark-Horovitz and V. A. Johnson. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 336-392.

(P15; EG-j)

110-P.* (French.) Effects of Radiation on the Physical Properties of Metals. J. Goens. *Revue de la Mécanique,* v. 3, Oct. 1957, p. 140-152.

Radiation can damage reactor components by three different mechanisms: interaction of products of fission with atoms of crystal lattice of the nuclear fuel; elastic collisions of neutrons with atoms of a crystal lattice; effects of ionization due to products of fission, to atoms displaced in lattices, and to beta and gamma rays. These mechanisms cause structural defects affecting properties of parts subjected to radiation, causing appearance of vacancies and interstitial atoms, of thermal spikes, and of atoms of chemical types not originally present in crystal, and modifying bonds between atoms of the lattice. Mechanical and physical properties of structural materials are greatly modified and fissionable metals, in some cases, undergo considerable change in dimension. Reactor permitting study of above phenomena is being designed for Belgian Center for Nuclear Studies. (P general, Q general, M25, 2-67)

111-P. (Hungarian.) **Technology of Production of Ferromagnetic Materials for High Tension Equipment. Pt. 2. Theory.** Ernö Neuhöffer. *Kohaszati Lapok,* v. 12, Nov. 1957, p. 455-459.

6 ref. (P16, T1; SGA-n)

112-P. (Russian.) **Solubility of Magnesium in Cast Iron.** A. F. Landa. *Liteinoe Proizvodstvo,* Aug. 1957, p. 27-29. (Also Henry Brutcher Translation no. 4070, Altadena, Calif.)

In relation to formation of spheroidal graphite. 17 ref.
(P12e, E25q; CI-r, *Mg*)

113-P. (Book.) **Metal Powder Association, Proceedings, 13th Annual Meeting,** v. 2, 1957, 204 p. Metal Powder Assoc., 130 W. 42nd St., New York 36, N. Y.

Collection of six papers read at Chicago, Apr. 30 to May 1, 1957, covering ferrites and electronic cores. Papers abstracted separately.
(P16, H general, T1; Fe)

114-P. Emissivities of Metallic Surfaces at 76° K. M. M. Fulk and M. M. Reynolds. *Journal of Applied Physics,* v. 28, Dec. 1957, p. 1464-1467.
(P17d)

115-P. Thermodynamics in Pyrometallurgy. J. W. Evans. *Research Applied in Industry,* v. 11, Jan. 1958, p. 12-18.

High-temperature thermodynamic studies; free energy data, experimental measurements and thermo-

dynamics of liquid steel and slags. 27 ref. (P12, D11n; ST, RM-q)

116-P. Correlation of the Thermomagnetic and Domain Behaviour of a Single Crystal of Silicon-Iron. L. F. Bates, D. A. Christoffel, H. Clow and P. F. Davis. *Royal Society, Proceedings,* v. 243, Series A, Dec. 24, 1957, p. 160-171.

18 ref. (P16c, Fe, Si, 14-61)

117-P. Elastic Scattering of Protons by Carbon, Aluminium, Nickel, Copper, Zinc, Niobium, Silver and Gold. G. W. Greenlees, L. Gioietta Kuo and M. Petravic. *Royal Society, Proceedings,* v. 243, Dec. 24, 1957, p. 206-216.

17 ref. (P17e, M25, 2-60; Al, C, Cb, Ag, Cu, Ni, Zn)

118-P. Surface Activity of Various Uranium and Uranium Alloy Ingots. J. Redfearn and B. W. Mott. *United Kingdom Atomic Energy Authority, Research Group,* A.E.R.E. M/M 12, 1957, 4 p.

The increased surface beta-activity of uranium alloy ingots prepared in a vacuum furnace is related to segregation of the thorium isotope at the surface, probably due to preferential oxidation. Beta counts up to 25 times that of normal uranium have been obtained from the ingot surfaces. (P17d; Th, U, 5-59)

119-P. Superconducting Transitions in Tin Whiskers. *U. S. National Bureau of Standards, Technical News Bulletin,* v. 12, Jan. 1958, p. 6-8.

(P15g, 14-61; Sn)

120-P. (German.) **Hydrogen and Eddy Current Losses of Iron With Different Silicon Content.** Friedrich Erdmann-Jesnitzer and Karl Schreck. *Neue Hütte,* v. 2, Oct. 1957, p. 626-636.

Magnetic behavior; hydrogen and magnetization. 41 ref. (P16s, 2-60; Fe, *Si, H*)

121-P. (German.) **Magnetic Measurements in the System Copper-Manganese.** Erich Scheil and Ernst Wachtel. *Zeitschrift für Metallkunde,* v. 48, Nov. 1957, p. 571-582.

Susceptibility maximum between 20 and 25 at. % Mn. Maximum increases by aging and decreases by plastic deformation. Ferromagnetic properties at diverse temperatures and structural states. (P16; Cu, *Mn*)

122-P. (German.) **Conductivity and Hall-Constant. Pt. 3. Alpha-Copper-Zinc-Alloys.** Werner Köster and Wolfgang Schüle. *Zeitschrift für Metallkunde,* v. 48, Nov. 1957, p. 588-591.

(P15; Cu, *Zn*)

123-P. (German.) **Conductivity and Hall Constant. Pt. 4. Copper-Nickel-Alloys.** Werner Köster and Wolfgang Schüle. *Zeitschrift für Metallkunde,* v. 48, Nov. 1957, p. 592-594.

(P15; Cu, Ni)

124-P. (German.) **Contribution to Calculation of Viscosity of Molten Metals.** Anton Hrbek. *Zeitschrift für Metallkunde,* v. 48, Nov. 1957, p. 603-605.

Thermodynamic interpretation of dependence of internal friction on temperature. A linear dependence between the reduced activation energy and the superheating of melt above the melting point. (P10f, P13a, Q22, 2-61; 14-60)

125-P. (Hungarian.) **Processes Causing Dimensional Changes in Hardened Steel. Pt. 1.** Zoltan Csepiga. *Kohaszati Lapok,* v. 12, June 1957, p. 228-233.

Phase alterations while heat treating. (P10d, N8, J general; ST)

126-P. Electronic Paramagnetic Resonance in Natural Beryllium Crystals. M. M. Zaripov and Iu. Ia. Shamonin. *Academy of Sciences of the USSR, Bulletin,* no. 11, p. 1114-1115. (Translation by Columbia Technical Translations.)

(P16p; Be)

127-P.* Thermodynamic Study of Fe-Ca-P-O, Fe-Ca-Si-P-O, and Some Complex Molten Silicophosphate Systems. E. T. Turkdogan and Patricia M. Bills. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 143-153.

The ferric-ferrous iron reaction was studied by equilibrating pure Fe-Ca-P-O and Fe-Ca-Si-P-O molten systems with carbon-dioxide-carbon-monoxide mixtures of known compositions at 1550° C. In the iron-calcium phosphate system there is a large miscibility gap at $P_{CO_2}/P_{CO} = 11.4$, but at higher oxygen potentials the composition range of this miscibility gap decreases. 17 ref. (P12, D11n; Fe)

128-P. Atomic Age Challenge to Steel. Edward A. Livingstone. *Journal of Metals,* v. 10, Feb. 1958, p. 111-113.

Steel application in reactor systems with special reference to neutron absorption cross-section, induced radioactivity and corrosion in reactor cooling systems. (P17, R4, W11p, 17-57, 2-67; ST)

129-P. (English.) **Magnetic Susceptibilities of Lanthanum and the Lanthanum-Hydrogen System.** B. Stalinski. *Academie Polonaise, Bulletin,* v. 5, no. 10, 1957, p. 997-1000.

12 ref. (P16; La)

130-P. (English.) **Measurements of the Galvanomagnetic Tensors of Bismuth.** Toshihiro Okada. *Physical Society of Japan, Journal,* v. 12, Nov. 1957, p. 1327-1337.

Anisotropy of galvanomagnetic effects in single crystals of pure Bi investigated between 160 and 45° C. Results were analyzed by the phenomenological theory of galvanomagnetic effects. 17 ref. (P16; Bi, 14-61)

131-P.* (French.) **Electrochemical Behavior of Boron. Potential-pH Diagram for the B-H_2O System at 25° C.** E. Deltombe, N. de Zoubov and M. Pourbaix. *Cebelcor, Rapport Technique no. 47,* Mar. 1957, 19 p.

Free enthalpy values, equilibrium reactions and formulas, stability of boron; formation and stability of boron hydrides; stability of boric acid and borates; constitution of boric solutions. 39 ref.
(P15, P12r, R10c; B)

132-P.* (French.) **Electrochemical Behavior of Bismuth. Potential-pH Diagram of the Bi-H_2O System at 25° C.** J. Van Muylder and M. Pourbaix. *Cebelcor, Rapport Technique no. 48,* May 1957, 13 p.

On basis of standard free enthalpy values of the system Bi-H_2O, an equilibrium diagram was established in function of pH and electrode potential at 25° C. Five solid substances, two dissolved and one gaseous were studied. Diagram provided general information on electro-chemical behavior of Bi, and conditions of stability and formation of Bi, its oxides and its ions. Operating conditions for use of Bi electrodes for measuring pH were also studied. (P15, P12r, R10c; Bi)

133-P.* (French.) **Electrochemical Behavior of Technetium. Potential-pH Diagram for the Tc-H_2O System at 25° C.** N. de Zoubov and M. Pourbaix. *Cebelcor, Rapport Technique no. 50,* May 1957, 12 p.

Free enthalpy values; equilibrium diagram covering three dissolved, five solid forms of technetium; stability conditions of Tc and its oxides; passivating effect of pertechnetates; theoretical possibility of use of technetium electrode to measure pH. 43 ref. (P15, P12r, R10c; Tc)

134-P.* (French.) **Electrochemical Behavior of Rhenium. Potential-pH Diagram for the Re-H_2O System at 25° C.** N. de Zoubov and M. Pourbaix. *Cebelcor, Rapport Technique no. 51,* May 1957, 14 p.

Free enthalpy values; equilibrium diagram for four dissolved, five solid forms of Re; conditions of stability and corrosion of Re and of stability of oxides of Re; passivating effect of perrhenates, which is compared to that of pertechnetates. 49 ref. (P15, P12r, R10c; Re)

135-P.* (French.) **Electrochemical Behavior of Tantalum. Potential-pH Diagram of the Ta-H_2O System at 25° C.** J. Van Muylder and M. Pourbaix. *Cebelcor, Rapport Technique no. 52,* May 1957, 10 p.

Diagram valid for solutions not containing substances capable of combining with Ta in soluble compounds was charted for metallic Ta and Ta_2O_5, and was used to study stability of these substances. Theoretical conditions of immunity and passivation of Ta were deduced. Diagram illustrates basic noncorrodibility of this metal in noncombining aqueous solutions of any pH, due to formation of protective oxide film. 45 ref. (P15, R10c; Ta)

136-P.* (French.) **Electrochemical Behavior of Columbium. Potential-pH Diagram of the Cb-H_2O System at 25° C.** J. Van Muylder, N. de Zoubov and M. Pourbaix. *Cebelcor, Rapport Technique no. 53,* June 1957, 11 p.

Free enthalpy values, theoretical conditions of stability of Cb, CbO, CbO_2 and Cb_2O_5; conditions of immunity and passivation of the metal. Cb is noncorrodible in noncombining solutions of any pH, due to formation of protective oxide film. 45 ref. (P15, P12r, R10c; Cb)

137-P.* (French.) **Electrochemical Behavior of Antimony. Potential-pH Diagram of the Sb-H_2O System at 25° C.** A. L. Pitman, M. Pourbaix and N. de Zoubov. *Cebelcor, Rapport Technique no. 55,* Jan. 1957, 18 p.

Free enthalpy values; influence of pH on solubility of Sb_2O_3 and Sb_2O_5; theoretical conditions of corrosion, immunity and passivation of antimony. Diagram was used to study general conditions of corrosion and noncorrosion of the metal, and operating conditions of two types of Sb electrodes. 34 ref.
(P15, P12r, R10c; Sb)

138-P.* (French.) **On the Evolution of the Electrical Resistance of Zone-Melted Cold Worked Aluminum During Annealing at −79° C.** Omourtague Dimitrov and Philippe Albert. *Comptes Rendus,* v. 245, Dec. 16, 1957, p. 2275-2277.

A technique was developed for rolling of Al in liquid nitrogen. Specimens thus cold worked, others cold worked at room temperature and placed at once at temperature of liquid nitrogen, plus others cold worked at −18° C., were then annealed at −79° C. and evolution of electrical resistance was measured. Al cold worked in liquid nitrogen developed resistance faster and in greater magnitude than other specimens, and recrystallized completely after 200 hr. at −52° C.; same metal cold worked at −18° C. recrystallized completely only after 200 hr. at −38° C. (P15g, N5, 3-68; Al)

139-P.* (French.) **L and K Absorption Spectra of Some Copper Alloys.** Annie Lucasson-Lemasson. *Comptes Rendus,* v. 246, Jan. 6, 1958, p. 94-97.

Results of measurements of L_{III} spectrum of Ni-Cu, Zn-Cu and Al-Cu alloys; of K spectrum of Ni-Cu and Zn-Cu alloys. 8 ref. (P17c; Cu)

140-P. (German.) **Physical Properties of Hard Metals as Function of Carbon Content.** R. Bernard. *Neue Hütte,* v. 2, Dec. 1957, p. 757-761.

5 ref. (P-general, M26, 2-60; EG-d37)

141-P.* (Spanish.) **The Brailsford Method of Determining Hysteresis Losses in Silicon Steels.** Francisco Marcos Villanueva. *Revista de Ciencia Aplicada,* v. 11, Nov-Dec. 1957, p. 530-534.

Experimental critique of magnetometric method proposed by Brailsford and comparison of results with those obtained by ballistic procedure. Variations of characteristic constants of Si steel when subjected to various types of mechanical and heat treatments.

(P16a, 1-54; AY, *Si,* SGA-n)

142-P.* **Experimental Investigation of Thermionic and Secondary-Electron Emission From Copper and Germanium in Transition From the Solid to the Liquid State.** V. G. Bol'shov. *Academy of Sciences of the USSR, Bulletin, Physical Series,* v. 20, no. 10, p. 1020-1026. (Columbia Technical Translations.)

Investigation to determine work functions of different faces of Cu and Ge crystals at the melting point. Values obtained differ greatly from those of other researchers; divergence is credited to high purity and cleanliness of materials studied and of equipment used in experiments. 8 ref. (P15k, N12; Cu, Ge)

143-P.* **Lattice Thermal Conductivity of Some Copper Alloys.** W. R. G. Kemp, P. G. Klemens and R. J. Tainsh. *Australian Journal of Physics,* v. 10, Dec. 1957, p. 454-461.

Thermal and electrical conductivities of three Cu-Zn alloys annealed at high temperatures and of two Cu-Au alloys, were measured over wide range of low temperatures and their lattice component of thermal conductivity deduced in the range 2-90° K. The high lattice thermal resistance at liquid helium temperatures previously found in Cu-Zn alloys appears to be a function of solute content rather than of concentration of conduction electrons, and can be reduced by high-temperature annealing. This extra resistance is thus due to dislocations locked in stable arrays by the presence of solute atoms, and not due to changes in the electronic band structure on alloying. 10 ref. (P11h, P16g; Cu, *Au, Zn*)

144-P. **Quantitative Theory of the Electro-Formation of Metal-Germanium Point Contacts.** A. C. Sim. *Journal of Electronics and Control,* v. 3, Aug. 1957, p. 139-159.

15 ref. (P15p; Ge)

145-P.* **Effect of Heat Treatment on the Bulk Lifetime of Excess Charge Carriers in Silicon.** L. M. Nijland and L. J. van der Pauw. *Journal of Electronics and Control,* v. 3, Oct. 1957, p. 391-395.

Effects of heat treatment in the range between room temperature and 1250° C. Bulk lifetime both in p and n-type crystals made by the floating zone method and of n-type crystals made by the Czochralski technique may be increased by annealing at temperatures between about 300 and 700° C. Annealing at temperatures higher than about 700° C. decreased lifetime both in p and n-type crystals. In all cases the samples were relatively slowly cooled. Bulk lifetime was measured by the conductivity modulation method. (P15, 2-64; Si)

146-P. **Transverse Magnetoresistance Effect in Indium Arsenide.** C. H. Champness and R. P. Chasmer. *Jour-*

nal of Electronics and Control, v. 3, Nov. 1957, p. 494-499.

6 ref. (P16; As, In)

147-P. Superconductivity of Lanthanum and Some Alloys. G. S. Anderson, S. Legvold and F. H. Spedding. *Physical Review,* v. 109, Jan. 15, 1958, p. 243-247.

(P15g; La)

148-P. X-Ray Study of Deuteron-Irradiated Copper Near 10° K. R. O. Simmons and R. W. Balluffi. *Physical Review,* v. 109, Jan. 15, 1958, p. 335-344.

61 ref. (P18, 2-67; Cu)

149-P. Solid Solutions Between Ferromagnetic and Antiferromagnetic Compounds With NiAs Structure. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 238-249.

13 ref. (P16, 14-67; Ni, As)

150-P. Low Temperature Electrical and Magnetic Behavior of Dilute Alloys of Mn, In, Cu. R. W. Schmitt and I. S. Jacobs. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 324-337.

30 ref. (P15g, P16, 2-63; Mn, Cu, In)

151-P.* Energy Loss in Transformer Steel. G. M. Leak. *Research Applied in Industry,* v. 11, Feb. 1958, p. 56-60.

Effects of carbon and nitrogen on high-purity alloys; nitrogen has greater influence. Most effective way to remove nitrogen or reduce its influence is by altering the shape and size of precipitated nitride. 11 ref. (P15, 2-60, N7; ST, SGA-n)

152-P.* Heats of Adsorption on Evaporated Nickel Films. D. F. Klemperer and F. S. Stone. *Royal Society, Proceedings,* v. 243, Jan. 14, 1958, p. 375-399.

The adsorption of oxygen, hydrogen and carbon monoxide has been studied on evaporated films of Ni prepared under varied conditions with a view to defining more precisely the differences in behavior between Ni films and Ni powder. Heats of adsorption on the films have been determined at room temperature using a resistance-thermometer calorimeter. Extent of the adsorption with oxygen and hydrogen has been assessed by means of krypton isotherms at 77° K., and by means of established correlations between activity and weight for equivalent films. 28 ref.
(P12q, P13d; Ni, 14-62)

153-P. Formation of Porosity in Uranium Under the Action of Thermal Cycling. A. A. Bochvar and G. I. Tomson. *Soviet Journal of Atomic Energy,* v. 2, no. 6, 1957, p. 637-643. (Translated by Consultants Bureau, Inc.)

(P10m, Q25p; U)

154-P.* Effects of Thermal Upsetting in 5052 Aluminum Alloy. R. E. Holt, E. C. Roberts and J. W. Anderson. *Trend in Engineering,* v. 10, Jan. 1958, p. 18-21.

Changes in structure, as well as plastic and elastic behavior of a structural alloy confined axially during heating to various elevated temperatures. 8 ref.
(P10d, 2-62; Q21, Q23; Al)

155-P. (English.) **Variation of the Hall Coefficient of Mg-Cd Superlattice Alloys With Degree of Order.** Kiyoshi Yonemitsu and Takao Sato. *Physical Society of Japan, Journal,* v. 13, Jan. 1958. p. 15-22.

7 ref. (P15p, N10, 2-61; Cd, Mg)

156-P. (English.) **Determination of Cold-Work Energy in Copper by Means of Electrochemical Potential Measurements.** Asher Peres. *Research Council of Israel, Bulletin,* v. 6C, Nov. 1957, p. 9-12.

5 ref. (P12; Cu)

157-P. (English.) **Sorption of Hydrogen by Nickel Wire.** Akiya Matsuda. *Research Institute for Catalysis, Journal,* v. 5, Nov. 1957, p. 71-86.

8 ref. (P13d; Ni, *H,* 4-61)

158-P. (German.) **Conductivity and Hall Constant. Pt. 7. Deformation and Recrystallization of Pure Metals.** W. Köster and W. Schüle. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 634-636.

(P15g, Q24, N5; Cu, Ag, Au, Pd, Pt, Mo, W, Al)

159-P.* Use of Search-Coil Apparatus for Eddy Current Testing of Copper and Its Alloys. N. B. Harvey. *Institute of Metals, Journal,* v. 86, Feb. 1958, p. 252-256.

New apparatus for rapid determination of conductivity. Main uses are for direct measurement of electrical conductivity, quantitative determination of small additions of a second element and indirect measurement of tensile properties in age hardened Cu alloys.
(P15g, Q27a, S11, 1-53; Cu)

160-P.* (French.) Magnetoelectric Properties of Thin Films of Nickel

Magnetized to the Saturation Point. Therese Rappeneau. *Comptes Rendus,* v. 246, Jan. 27, 1958, p. 571-574.

Thin films of Ni obtained by thermal evaporation were studied at room temperature between 4000 and 8000 Oe. Respective variations in electrical resistivity in function of magnetic field and angle between field and current were determined. Results compared with those given for solid Ni. (P16, P15g; Ni, 14-62)

161-P. (French.) **Study of the Magnetic Properties of a Series of Copper-Nickel Alloys.** Andre J. P. Meyer and Claude Wolff. *Comptes Rendus,* v. 246, Jan. 27, 1958, p. 576-579.

6 ref. (P16; Cu, Ni)

162-P.* (French.) **Predictions of Curie Temperature for Different Types of Crystal Lattices.** G. Fournet. *Journal de Physique et le Radium,* v. 18, Dec. 1957, p. 663-671.

Review of Yvon theory; application to flat square-base lattice, flat triangular, hexagonal, face-centered cubic, simple cubic and cubic-centered structures gives very good approximate results. Concludes that theory is equally valid for all structures. 22 ref. (P16d, M26)

163-P.* (French.) **Electronic Theory of Metals and Its Applications to the Electrical Conductivity of Metals and Alloys.** Eugene Darmois. *Societe Francaise des Electriciens, Bulletin,* v. 7, Dec. 1957, p. 754-764.

Exposition of Drude-Lorentz and Summerfeld theories and some newer theories; equations for liquid Hg, Bi, Ga, Cu and K; consideration of Al-Cu alloys and others; description of a study of Al bronzes.
(P15g; Hg, Bi, Ga, Cu, K, Al, 14-60)

164-P. (German.) **Conductivity and Hall Constant. Pt. 6. Aluminum-Silver Alloys.** W. Koster and W. Schule. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 628-633.

(P15g, P15p; Al, Ag)

165-P.* (German.) **Development of Alnico Magnets Containing Copper and/or Titanium.** Wilhelm Zumbusch. *Zeitschrift für Metallkunde,* v. 49, Jan. 1958, p. 1-8.

Improvement of Al-Ni-Co-Fe alloys by addition of Cu and Ti, also by two-stage tempering and annealing in magnetic field. Development of anisotropic magnets. Testing of magnets. (P16, 2-60; SGA-n)

166-P. (German.) **Theory of Ferromagnetism. Pt. 1. Atomic Structure.** Klaus Meyer. *Zeitschrift für Naturforschung,* v. 12a, Oct. 1957, p. 786-797.

8 ref. (P16, M25)

167-P. (German.) **Electric Conductivity of Metals at Low Temperatures.** I. Supek. *Zeitschrift für Physik,* v. 149, no. 3, 1957, p. 324-328.

(P15g, 2-63)

168-P.* (Spanish.) **Influence of Mechanical Cuts on the Magnetic Properties of a Silicon Steel.** Victor S. Giron Nunez. *Instituto del Hierro y del Acero,* v. 10, Oct-Dec. 1957, p. 429-440.

Five specimens of silicon steel in different conditions of stress were studied and variations of as much as 100% were found in their magnetic properties. By attributing to the internal stresses a parameter related to the reversible magnetizing force, a linear variation in terms of this parameter is found for the coercive field and hysteresis losses. The magnetic field for which the maximum of permeability is produced is also related to this parameter by means of a linear function. (P16, 3-66; AY, *Si*)

169-P.* **Solubility of Nitrogen in Iron-Chromium Alloys.** E. T. Turkdogan and S. Ignatowicz. *Iron and Steel Institute, Journal,* v. 188, Mar. 1958, p. 242-247.

Determination of solubility of nitrogen in Fe-Cr alloys at 900-1400° C. Results of examination by X-ray. Activity of nitrogen in alpha and liquid phases; effect of nitrogen on austenite stability. (P12e; Fe, Cr, *N*)

170-P. **Microwave Resonance in Nickel at 35 Ge/s (kMc/s).** G. S. Barlow and K. J. Standley. *Physical Society, Proceedings,* v. 71, Jan. 1, 1958, p. 45-48.

13 ref. (P17c; Ni, Cu)

171-P. **Physical Properties of Certain Liquid Binary Alloys of Tin and Zinc.** T. C. Toye and E. R. Jones. *Physical Society, Proceedings,* v. 71, Jan. 1958, p. 88-99.

Viscosity, density and specific resistance of several Sn-based and Zn-based binary alloys over various temperature ranges.
(P10a, P10f, P15g; Sn, Zn)

172-P.* **Convection and Radiation in High Speed Heating.** Norman H.

Davies and Richard J. Reed. *Steel Processing and Conversion*, v. 44, Mar. 1958, p. 155-160, 162.

High-speed heating produces less scale on pieces, permits smaller furnaces and is adaptable to automation; however, overheating and nonuniformity problems arise, initial cost is high. Convection and radiation methods are both applicable. (P11, J-general)

173-P. Electronic Specific Heat of Sodium Tungsten Bronze. Robert W. Vest, M. Griffal and J. F. Smith. Iowa State College. *U. S. Atomic Energy Commission*, ISC-899, Mar. 1957, 75 p.

50 ref. (P12r; Cu-s, *Na, W*)

174-P.* (English.) **Effect of Silicon, Chromium and Manganese on Equilibrium of Carbon and Oxygen in Molten Iron Saturated With Carbon. Pt. 2.** Siro Ban-ya and Sachio Matoba. *Tohoku University, Technology Reports*, v. 22, no. 1, 1957, p. 97-108.

Addition of Si (5.2%) causes a decrease in solubility of graphite, while Cr (20%) and Mn (40%) increase solubility. Formation of oxides was not observed in the gas phase. Effects of these additions on the activity of graphite were computed. Addition of Si decreases oxygen content, while Cr increases it. Interaction parameter of carbon and oxygen in molten Fe was calculated in the 3.4-7% range. 15 ref. (P12, 2-60; Fe)

175-P. (German.) **Stability of Molybdenum Sulphide in Gases at High Temperatures.** G. Eckert. *Werkstoffe und Korrosion*, v. 9, Feb. 1958, p. 69-72.

12 ref. (P13, 2-62, 2-66; Mo, 14-68)

176-P.* (Japanese.) **Study of Aluminum Conductors. Pt. 2.** Kengo Ikeda, Tosio Isobe and Akira Hanada. *Light Metals (Tokyo)*, v. 8, Jan. 1958, p. 5-18.

Effects on electrical conductivity and tensile strength of addition of various metals. Si, Fe, Cu, Cr, Mn, Mg, Ti and V lower conductivity; B tends to decrease conductivity of Ti and V. Th, V, B, and Zn lower tensile strength, while Si, Fe, Cu, Mg, Zr, Ca, and Ni increase it. The small amount used in this experiment indicates that Ni, Ca and Zr increase tensile strength without effecting conductivity. 15 ref. (P15g, 2-60, Q27a; Al, SGA-r)

177-P. Nickel Alloys for Controlled Thermal Expansion. E. M. Wise. *Inco*, v. 27, Dec. 1957, p. 19-21.

Information on the thermal expansivity of Ni-Fe and other Ni alloys. (P11g; Ni-b)

178-P. Get Tailor-Made Properties With Sintered Steel. Robert Talmage. *Iron Age*, v. 181, Apr. 3, 1958, p. 104-106.

(P10a; 6, ST)

179-P. (French.) **Magnetic Nuclear Resonance.** R. E. Richards. *Metaux-Corrosion-Industries*, v. 32, Dec. 1957, p. 482-489.

20 ref. (P16f)

180-P. (Book.) **Permanent Magnet Handbook.** Earl M. Underhill. 380 p. 1957. Crucible Steel Co. of America, Pittsburgh 30, Pa. $10.

(P16; SGA-n)

181-P. Calculation of Forging Cooling Rates. D. P. Timo and R. M. Goldhoff. *American Society of Mechanical Engineers*, Paper no. 58-SA-4, June 1958, 11 p.

9 ref. (P11k, F22, 4-51)

182-P. Viscosity and Density of Liquid Metals. Shashanka S. Mitra. *Physica*, v. 24, Feb. 1958, p. 155-156.

Equation for the temperature dependence of the coefficient of viscosity of Ca and Sn. 3 ref. (P10a, P10f; Ca, Sn)

183-P.* (French.) **Thin Ferromagnetic Films. Electrical Properties of Thin Deposits of Nickel.** Guy Goureaux and Antoine Colombani. *Comptes Rendus*, v. 246, Feb. 3, 1958, p. 741-744.

Experimental study of electrical conductivity of Ni deposits on W filament shows influence of thickness of deposit on electrical resistance. (P15g; W, *Ni*, 14-62)

184-P.* (French.) **On Variations of the Optical Properties of Very Thin Films of Silver When Exposed to Air.** Jean Trompette. *Comptes Rendus*, v. 246, Feb. 3, 1958, p. 753-756.

Thin films of Ag mounted on transparent base were prepared by evaporation in vacuo and reflectivity and transmissivity were measured. Specimens were then transferred to ordinary atmosphere and new measurements were taken. (P17a, P17c; Ag, 14-62)

185-P. (French.) **Note on the Coupling of the Electrons of a Metal by Anti-Parallel Spin Pairs and the Theory of Supraconductivity.** Jacques des Cloizeaux. *Comptes Rendus*, v. 246, Feb. 10, 1958, p. 904-906.

(P15, P16)

186-P. (French.) **Note on the Electrical Properties of Very Thin Films of Silver.** Clement Uny and Nicolas Nifontoff. *Comptes Rendus,* v. 246, Feb. 10, 1958, p. 906-909.

Deviations from Ohm's law. (P15; Ag, 14-62)

187-P.* (French.) **Anomalies of Resistivity in Certain Magnetic Metals.** P. G. de Gennes and J. Friedel. *Physics and Chemistry of Solids,* v. 4, No. 1/2, 1958, p. 71-77.

Anomalous resistivity of some rare earth metals and of alloys such as AuMn and Au_2Mn is studied by assuming a connection between conduction electrons and atomic spins. Magnitude of corresponding coss-section is treated as a phenomenological quantity. At high temperatures, atomic spins are at random and conduction electrons have a finite mean free path. At low temperatures, atomic spins are all aligned and no scattering can occur. Short-range order effects in the spin lattice are analyzed in the Born approximation and shown to be small in most physical situations. 16 ref. (P15g; SGA-n)

188-P. (German.) **Potential Oscillations in Iron and Zinc Electrodes Submerged in Sulphuric Acid.** Hans Ludering. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 625-632.

Theoretical explanation and resulting differential equation. 20 ref. (P15; Fe, Zn)

189-P.* (German.) **Utilization of Thermomagnetic Analysis for the Observation of Transformation Properties of Iron Alloys Between −150 [°C] and + 1500 [°C].** Rudolf Kohlhaas and Heinrich Lange. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 645-653.

The phase transformations of Fe and its alloys can be observed and investigated by utilizing the magnetic susceptibility of these substances in the paramagnetic as well as the ferromagnetic range. The behavior in extremely high and low temperatures is observed in a chamber with a built-in permanent magnet. The chamber can be evacuated and pressurized. Diagrams showing the magnetic susceptibility in dependence of the temperature clearly indicate the phase transformations (Curie points) for various alloys. 12 ref. (P16, N11; Fe-b)

190-P. (German.) **Effect of Alloy Additions on Conductivity of Metals.** F. Pawlek and K. Reichel. *Metall,* v. 12, Jan. 1958, p. 1-6.

Electric resistance of a pure metal can be increased by alloying. Some 142 values for increased resistance, arranged in tables or shown in graphs. 55 ref. (P15g, 2-60)

191-P. (Russian.) **Study of Radioactivity of Nonmetallic Inclusions in Steel During Electrolysis.** M. I. Tsekhanskii, N. I. Shishkina and K. B. Khusnoyarov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1440-1442.

7 ref. (P18; ST, 9-69)

192-P. (Russian.) **Conditions for Demagnetizing Samples of Transformer Steel.** V. V. Druzhinin and Yu. A. Lazarev. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1451-1454.

(P16; ST, SGA-n)

193-P. Aluminum Piston Alloys in Germany. Herman Kessler. *Light Metals,* v. 21, Mar. 1958, p. 85-88. (From Technical Report no. 28 of the Aluminumwerke Nürnberg G.m.b.H.)

Technical and physical characteristics of eutectic hypereutectic alloy and hypo-eutectic Al-Si alloys with especially high Si content. (P-general, Q-general, T17, 17-57; Al)

194-P. Properties of Silicon Doped With Iron or Copper. C. B. Collins and R. O. Carlson. *Physical Review,* v. 108, Dec. 15, 1957, p. 1409-1414.

Both Fe and Cu introduce deep levels into the forbidden band of Si which are observable by electrical and optical measurements. 26 ref. (P15, P17; Si, *Fe, Cu*)

195-P. Temperature Dependence of the Magnetic Susceptibility of Alpha-Silver-Zinc Alloys. Lothar Meyer and Dan Weiner. *Physical Review,* v. 108, Dec. 15, 1957, p. 1426-1427.

Magnetic susceptibility measured from 5-35% Zn between room temperature and helium temperatures. All samples became slightly more diamagnetic with decreasing temperature, and any temperature-dependent paramagnetic contribution to the susceptibility due to bound electron states must be less than 0.1% of the room-temperature value of the susceptibility. 9 ref. (P16, 2-61; Ag-b, Zn-b)

196-P. K-Emission Spectrum of Metallic Lithium. D. E. Bedo and D. H. Tomboulian. *Physical Review,* v. 109, Jan. 1, 1958, p. 35-40.

The emission spectrum of an evaporated Li target investigated in spectral region extending from 60 to 600 A. The intensity distribution of the characteristic K-emission

was determined photometrically. 18 ref. (P17d; Li)

197-P.* Normal and Superconducting Heat Capacities of Lanthanum. A. Berman, M. W. Zermansky and H. A. Boorse. *Physical Review,* v. 109, Jan. 1, 1958, p. 70-76.

The heat capacities of three samples of La measured in the temperature range 1.6 to 6.5° K. A four-constant formula was found which represented the resistance-temperature relation of the carbon composition resistance thermometer from 1.6 to 7.2° K. Two superconducting transitions were found in each sample: one at 4.8° K. and the other at 5.9° K. These are associated respectively with the hexagonal close-packed and face-centered cubic modifications of the metal. (P12r; La)

198-P. On the Spectral Characteristics of the External Photoelectric Effect from an Activated Copper-Magnesium Alloy. V. N. Lepeshinskaia and G. A. Iudaev. *Soviet Physics, Technical Physics,* v. 2, no. 3, 1957, p. 450-454. (Translation by American Institute of Physics.)

5 ref. (P15k, P17e; Cu-b, Mg-b)

199-P. Study of the Thermal Conductivity of Lead Telluride. E. D. Deviatkova. *Soviet Physics, Technical Physics,* v. 2, no. 3, 1957, p. 414-418. (Translation by American Institute of Physics.)

Study of a material that can be used in development of thermoelectric batteries, and to examine question of possible mechanisms of thermal conductivity in semiconductors. 5 ref. (P11h; Pb-b, EG-j45)

200-P. Iron-Silicon Alloys With Orientated Structure. Fritz Assums, Richard Boll, Dieter Ganz and Friedrich Pfeifer. *Zeitschrift für Metallkunde,* v. 48, June 1957, p. 341-349. (Iron and Steel Institute, Translation no. 712.)

Previously abstracted from original. See item 342-P, 1957. (P16r, 3-72; Fe, Si)

201-P. (French.) New Observations on the Role of Adsorbed Oxygen in Modifications of the Equilibrium Profile of Metallic Surfaces at High Temperatures. Jacques Benard, Jean Moreau and Finn Gronlund. *Comptes Rendus,* v. 246, Feb. 3, 1958, p. 756-758.

(P13d; O)

202-P. (French.) Allowable Current Capacities in Bars and Sections Made of Aluminum and Aluminum Alloys. Pierre Chapoulie and Rene Rols. *Revue de l'Aluminium,* v. 35, Jan. 1958, p. 87-95.

Calculation of current capacity of Al and Al alloy (A-GS) bars and sections by mathematical formula. (P15g; Al)

203-P.* (Italian.) Research on Copper-Chromium-Silicon and Copper-Cobalt-Silicon Alloys Having High Electrical Conductivity. Sergio Gallo. *Metallurgia Italiana,* v. 50, Jan. 1958, p. 15-19.

Study of suitability of two heat treatable Cu alloys for manufacture of resistance welding electrodes. Addition of Si to Cu-Cr alloys assures complete deoxidation during manufacture; proper amounts of Si provide Brinell hardness and electrical conductivity comparable to tht of electrolytic Cu, and a recrystallization temperature above 500° C. Si can be substituted for Be in Cu-Co-Be alloys with equally good results. Crystal structure of silicides formed in both cases (cubic for Cu-Cr-Si system, orthorhombic for Cu-Co-Si) studied. 12 ref. (P15g, Q-general, M26, W29h, 17-57; Cu-b, *Cr, Si, Co*)

204-P.* New Stainless Steel to Beat Heat Barrier. *Materials in Design Engineering,* v. 47, May 1958, p. 104-105.

Report on a modified 18-8 steel which can be formed soft then hardened by heat treatment. New steel has coefficient of thermal expansion considerably below 18-8, excellent resistance to corrosion, stress-corrosion cracking, and is easily welded. (P11g, R-general, Q-general; SS)

205-P. Metallurgical Aspects of Semi-Conductors. John Pratt. *Metal Industry,* v. 92, Apr. 11, 1958, p. 287-289.

Brief summary of six papers presented at a Symposium of the Metal Physics Committee of the Institute of Metals. (P15; EG-j31)

206-P.* (German.) Optical Properties of Iron Oxide Smoke. W. Pepperhoff and Cord Passow. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 77-82.

Radiation of converter flames is determined experimentally and represented in diagrams in dependence of time. The radiation originates from the optical properties of iron oxide smoke. The radiation curves

indicate a maximum of radiation near the end of the blowing operation. 15 ref. (P17, D3b; Fe, 14-68)

207-P. (Russian.) **Differential Magnetic Ballistic Method for Measurement of Paramagnetic Phases.** Ya. I. Kagan and Yu. I. Pascal. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1455-1456.

(P16p, 1-53)

208-P. (Russian.) **Method to Determine Sealed Porosity and Defects in Metallic Structure.** B. V. Lukin and V. G. Nagornyl. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1458-1461.

Quantitative method based on comparison of specific weights as determined by X-ray and pycnometer. (P10m, M27, 1-53)

209-P. (Russian.) **Method of Constructing Actual Characteristics of Materials During Uniaxial Elongation and Contraction.** K. K. Likharev. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1472-1477.

4 ref. (P10d)

210-P.* Graphite as a High Temperature Material. John E. Hove. *AIME Transactions,* v. 212, Feb. 1958, p. 7-13.

High-temperature physical properties of graphite interpreted in the light of present-day knowledge of the mechanisms affecting these properties. 22 ref.
(P-general, 2-62; NM-k36)

211-P. Electric Conductivity as Nondestructive Testing Method for Structural Changes in Surface Layers. A. Keil. *AIME Transactions,* v. 212, Feb. 1958, p. 63-64.

Experiments with Ag alloys containing 8% Cd with Ag-Cu alloys show that decomposition of the homogeneous solid solution by internal oxidation may have differing effects on conductivity. Eddy-current measurements are a convenient aid in measuring the structural differences between homogeneous alloys and the state reached by the thermal treatment. 8 ref.
(P15g, 1-54, N-general, Ag-b, *Cu*)

212-P. On the Solubility of Iron in Magnesium. K. Anderko, A. S. Yamamoto and W. Rostoker. *AIME Transactions,* v. 212, Feb. 1958, p. 85.

(P12, Mg, *Fe*)

213-P.* Solubility of Nitrogen in Liquid Iron and Iron Alloys. Vikosh C. Kashyap and Norman Parlee. *AIME Transactions,* v. 212, Feb. 1958, p. 86-91.

Solubilities of nitrogen in liquid iron and liquid Fe-Ni, Fe-Mo, Fe-V and Fe-Mo-V alloys were measured by the Sieverts method. Measurements were made at 1600 to 1800° C. on binary alloys up to 20% Ni, 10% V, 10% Mo; and on ternary alloys containing 0 to 3% V with 0 to 5% Mo. Results confirm that Sieverts' law is obeyed in the range 50 to 750 mm. pressure. 19 ref. (P12e, *N,* Fe)

214-P. Activity Measurement in the System Iron-Chromium. C. L. McCabe, R. G. Hudson and H. W. Paxton. *AIME Transactions,* v. 212, Feb. 1958, p. 102-105.

Vapor pressures of pure Fe and pure Cr measured by the Langmuir and Knudsen methods agree within experimental error at 1200° C. Knudsen cell experiments show that Cr and Fe show thermodynamic behavior close to ideal at 1205 and 1250° C. in the system Fe-Cr. 12 ref. (P12; Fe, Cr)

215-P.* The Vapor Pressure of Palladium. J. F. Haefling and A. H. Daane. *AIME Transactions,* v. 212, Feb. 1958, p. 115-116.

Vapor pressure of Pd was found to be higher than the estimated values in literature by a factor of about 15. Results indicate an abnormally weak binding in the case of Pd which is consistent with the lower value of the heat of vaporization found. 13 ref. (P12c; Pd)

216-P.* Thermodynamic Study of Liquid Pb-Zn Solutions. F. D. Rosenthal, G. J. Mills and F. J. Dunkerley. *AIME Transactions,* v. 212, Apr. 1958, p. 153-161.

Activities, free energies and heats and entropies of mixing of liquid Pb-Zn alloys obtained by the electrode-potential method between 400 and 650° C. A vapor-pressure method was used to extend the activity measurements to 900° C., allowing the maximum of the immiscibility gap to be estimated by thermodynamic calculation. Data on the monotectic and eutectic points. 18 ref. (P12; Pb, Zn)

217-P.* Studies on the Metallurgy of Silicon-Iron. Pt. 1. Silicon Nitrides. Pt. 2. Anomaly in the Alpha Solid Solution. Alan U. Seybolt. *AIME Transactions,* v. 212, Apr. 1958, p. 161-167.

Pressure-temperature relations required to maintain the existence of

Si_3N_4 in Si-Fe of 0.44-11.7% Si partially explored. Calculation of some thermodynamic quantities; evidence of an order-disorder two-phase field extending at 800° C. from about 1 to 5.5% Si. 16 ref. (P12, N10; Si, Fe)

218-P. Solubility and Activity of Titanium in Carbon-Saturated Iron. F. D. Delve. *AIME Transactions,* v. 212, Apr. 1958, p. 183-185.

(P12e, P12b; Fe, *C, Ti*)

219-P. Reduction of Magnetic Susceptibility in Beryllium-Copper. Harold Bernstein. *AIME Transactions,* v. 212, Apr. 1958, p. 225-226.

Presence of iron impurity causes variations in magnetic properties. Effect of small amounts of iron on susceptibility. (P16, 1-60; *Be,* Cu)

220-P. Magnetic Properties and the Structure of Metals. W. Sucksmith. *British Journal of Applied Physics,* Supp. 6, 1957, p. S24-S27.

Use of magnetic properties to detect variations in structure and properties of magnetic materials. Newer developments in magnetism and their application. 9 ref. (P16, S13h; SGA-n)

221-P. Heat Transfer Through Coated Metal Surfaces. Robert L. Lee. *Corrosion,* v. 14, Apr. 1958, p. 187t-188t.

Application of 4-mil phenolic and 15-mil vinyl coatings on steel in heat exchangers decreased corrosion and gave higher heat transfer rates than ultimately experienced with corroded uncoated metal surfaces. (P11k, W13b, 8-70)

222-P.* Note on the Influence of Sodium on Magnesium-Lithium Alloys. R. J. M. Payne and J. D. L. Eynon. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 351-352.

Solubility of sodium in Mg-Li alloys varies with temperature. Alloys containing Na may become embrittled on standing at ordinary temperatures or during certain heat treatments. Tolerance for Na depends on grain size; for a cast binary 12% Li alloy it is in the region of 0.002%. 8 ref. (P12e, Q26s, 2-60; Mg-b, *Li, Na*)

223-P.* Some Investigations on Plutonium Metal. E. Dempsey and A. E. Kay. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 379-384.

An adiabatic method for measuring specific heat of Pu which makes use of the self-heating of the metal to raise the temperature of the specimen. Results for the alpha phase above room temperature, including an estimate of the alpha→beta heat of transformation. Preliminary experiments on the oxidation of Pu in air. 16 ref. (P12q, P12r; Pu)

224-P.* The Determination of the Solubilities of Beryllium and Molybdenum in Liquid Bismuth. G. W. Horsley and J. T. Maskrey. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 401-402.

Solubility of Be in Bi determined in the range 700-1000° C.; equation for its variation with temperature. Solubility of Mo in Bi is below the limits of analytical detection (1 ppm.) up to 1030° C. (P12e; Be, Bi, Mo)

225-P. Heat Capacity of Sodium Tungsten Bronzes From 1.8 to 4.2° K. R. W. Vest, M. Griffel and J. F. Smith. *Journal of Chemical Physics,* v. 28, Feb. 1958, p. 293-296.

19 ref. (P12r, 1-63; Cu-s, *Na, W*)

226-P. Effect of Plastic Deformation on the Electrical Resistivity of Chromium. *Nature,* v. 181, Feb. 15, 1958, p. 477-478.

10 ref. (P15g, 3-68; Cr)

227-P. Magnetoresistance Coefficients and Their Temperature Dependence in Iron and Silicon Steel. Eiji Tatsumoto. *Physical Review,* v. 109, Feb. 1, 1958, p. 658-662.

6 ref. (P16, 2-61; Fe, AY, *Si*)

228-P. Radiation Damage Experiments and the Nature of Thermal Spikes in III-V Compounds. Ulrich Gonser and Boudewyn Okkerse. *Physical Review,* v. 109, Feb. 1, 1958, p. 663-667.

Results of resistivity measurements on gallium-antimony alloys during irradiation and of X-ray observations after irradiation suggest strongly that thermal spikes are introduced. 16 ref. (P15, 2-67; Ga, Sb)

229-P. Paramagnetic Effect in Superconductors. Pt. 5. Resistance Transition of Tin Wires. Hans Meissner. *Physical Review,* v. 109, Feb. 1, 1958, p. 668-680.

35 ref. (P15g, P16p; Sn, 4-61)

230-P. Paramagnetic Effect in Superconductors. Pt. 6. Resistance Transitions in Indium Wires. Hans Meissner and Richard Zdanis. *Physi-*

cal Review, v. 109, Feb. 1, 1958, p. 681-685.

6 ref. (P15g, P16p; In, 4-61)

231-P. Heat Capacity in the Normal and Superconducting States and Critical Field of Niobium. Chien Chou, David White and H. L. Johnston. *Physical Review,* v. 109, Feb. 1, 1958, p. 788-796.

23 ref. (P12r, P15g; Cb)

232-P. Heat Capacity in the Normal and Superconducting States and Critical Field of Tantalum. David White, Chien Chou and H. L. Johnston. *Physical Review,* v. 109, Feb. 1, 1958, p. 797-802.

10 ref. (P12r, P15g; Ta)

233-P. The Superconductive Critical Temperature and the Electronic Specific Heat of Impure Tin. E. A. Lynton, B. Serin and M. Zucker. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 165-174.

Measurements of the threshold magnetic field as a function of temperature for specimens of tin containing 0.04 to 2.0 at. % of various impurities gave the superconductive critical temperature as well as the temperature coefficient of the electronic specific heat of the normal phase. 24 ref. (P15g; P12r; Sn)

234-P. Effect of Alloying on the Superconducting Transition Temperature of Tin. A. B. Pippard. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 175-177.

A semi-classical treatment of electron-phonon interaction suggests that the interaction is reduced if the electrons are appreciably scattered by impurities, the reduction being expressible in terms of the ratio of phonon wavelength to electronic free path. 4 ref. (P15g, 3-69; Sn)

235-P. Low Temperature Electrical and Magnetic Behavior of Dilute Alloys of Mn in Cu. R. W. Schmitt and I. S. Jacobs. *Physics and Chemistry of Solids,* v. 3, no. 3/4, 1957, p. 324-337.

30 ref. (P15, P16, 2-63; Cu, *Mn*)

236-P.* Hall Effect and Electrical Conductivity of Transition-Metal Diborides. H. J. Juretschke and R. Steinitz. *Physics and Chemistry of Solids,* v. 4, no. 1/2, 1958, p. 118-127.

The room-temperature resistivity and Hall constant of the diborides of the fourth to sixth-column transition metals and their solid solutions have been measured to clarify the electronic structure of these compounds. 15 ref. (P15g; 14-68, B)

237-P. Thermodynamics and Magnetic Structures of the Allotropic Modifications of Manganese. R. J. Weiss and K. J. Tauer. *Physics and Chemistry of Solids,* v. 4, no. 1/2, 1958, p. 135-143.

15 ref. (P12, P16, N6p; Mn)

238-P. Superconductivity in the Ni-Pd-As System. B. T. Matthias and S. Geller. *Physics and Chemistry of Solids,* v. 4, no. 1/2, 1958, p. 156-157.

6 ref. (P15g; Ni, Pd, As)

239-P. Determination of Cold-Work Energy in Copper by Means of Electrochemical Potential Measurements. Asher Peres. *Research Council of Israel, Bulletin,* v. 6c, Nov. 1, 1957, p. 9-12.

5 ref. (P12, Q24, P15g; 1-53)

240-P. Superconducting Transitions in Tin Whiskers. *Tech Engineering News,* v. 39, Jan. 1958, p. 40-42.

(P15; Sn, 14-61)

241-P. Irreversible Changes in Length of Zinc Under Thermal Stress. K. Claus and K. Lohberg. *United Kingdom Atomic Energy Authority,* IGRL-T/C-43, 1957, 17 p.

Changes of length with segregation processes; analysis of length changes with annealing of high-grade Zn; length changes due to thermal cycling; explanation due to anisotropy of the Zn crystal; length changes with recrystallization and grain growth; associated changes in the thermal expansion coefficient, the elastic modulus and the texture. 9 ref. (P10d, P11g; Zn)

242-P.* Properties and Applications of Commercial Molybdenum and Molybdenum Alloys. R. R. Freeman. Paper from "The Metal Molybdenum", American Society for Metals, p. 10-30.

Physical, chemical, mechanical properties; transition temperatures; creep-rupture properties; commercial availability; fabricating methods. Fields of future application include the glass industry, metalworking, chemical and nuclear energy (for heat exchangers), aircraft and missiles, high-temperature engines. 9 ref.

(P-general, Q-general, 17-57; Mo)

243-P. Electric Properties of Some Compounds of Elements in the Third and Fifth Groups of the Periodic Table (InAs and InSb). D. N. Nasledov and A. Iu. Khalilov. *Academy of Sciences of the USSR, Bulletin,* v. 20, no. 12, 1956, p. 1370-1371. (Columbia Technical Translations, Inc.)

The temperature dependence of the conductivity of samples with p and n-type conductivity was determined in the range from 1.3° K. The Hall coefficent in the region of the transition from intrinsic conductivity changes sign as the magnetic field intensity is increased, which is in agreement with Madelung's theory. An anomalous increase in the carrier mobility with heating of the sample was observed in indium arsenide at high temperatures. (P15; In, Sb, As)

244-P. Structure and Electrical Properties of Indium Antimonide in Thin Layers. I. D. Konozenko and S. D. Mikhnovskii. *Academy of the USSR, Bulletin,* v. 20, no. 12, 1957, p. 1363-1367. (Columbia Technical Translations, Inc.)

Properties and possible uses of intermetallic compounds. 10 ref. (P15, M26q; In, Sb)

245-P. Semiconductor Properties of Magnesium-Bismuth Alloys. A. K. Kikoin and G. D. Fedorov. *Academy of Sciences of the USSR, Bulletin,* v. 20, no. 12b, 1957, p. 1377-1383. (Columbia Technical Translations, Inc.)

Investigation of the Mg-Bi system shows that these alloys, in the vicinity of the stoichiometric Mg_3Bi_2 composition, are extrinsic semiconductors. The compound Mg_3Bi_2 itself has attributes of dielectrics. 14 ref. (P15, M24b; Bi, Mg)

246-P. Electrical Properties of Manganese-Germanium Alloys. I. G. Fakidov, N. P. Grazhdankina and V. N. Novogrudskii. *Academy of Sciences of the USSR, Bulletin,* v. 20, no. 12b, 1957, p. 1384-1391. (Columbia Technical Translations, Inc.)

Investigation of conditions under which ferromagnetism and antiferromagnetism develop. The Mn-Ge system comprises three ferromagnetic phases, corresponding to the compounds Mn_5Ge_2, Mn_5Ge_3 and Mn_3Ge_2. 8 ref.
(P15, P16, M24b, Ge, Mn)

247-P.* (French.) **Curie Points of Solid Solutions of Ni-Cu-Au.** V. Marian, I. Maxim, I. Ursu and V. Cristea. *Revue de Physique,* v. 2, no. 1, 1957, p. 106-108.

Nine specimens of different alloy concentrations were heat treated in vacuum in small quartz flask for 12 hr. at 1000 °C. before quenching. Results of measurements of Curie points and solid solution limits permit conclusion that Hume-Rothery iso-electronic law is satisfied, even in case of Ni-Cu-Au alloys.
(P16d, N12p; Ni, Cu, Au)

248-P. (German.) **Conductivity and Hall's Constant. Pt. 9. Method of Separate Determination of Density and Mobility of Charge Carriers With Various Charges.** Hans-Eberhard Schmidt. *Zeitschrift für Metallkunde,* v. 49, Mar. 1958, p. 113-123.

Method using estimation of thermo-electric power and Ettinghausen-Nernst coefficient.
(P15g, 1-54; Cu, Ni, Au, Ag, Cr)

249-P.* (German.) **Investigation on Electrical Conductivity of Gold-Manganese Alloys.** Heinz Eicke. *Zeitschrift für Metallkunde,* v. 49, Mar. 1958, p. 157-161.

Conductivity of Au-Mn alloys with various Mn concentrations at temperatures between −200 and 800° C. Occurrence of intermetallic phases in quenched and tempered alloys. Temperature coefficients of resistance in range 0-100° C.
(P15g, 2-61; Au, Mn)

250-P. (Rumanian.) **Contribution to the Experimental Study of the Viscosity of the Basic Openhearth Slags. Pt. 1. Laboratory Study of the Viscosity and Conductivity of the Basic Slags.** I. Tripsa. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 289-310.

15 ref. (P10f, D11n; RM-q)

251-P. (Rumanian.) **Some Theoretical Problems of the Structure and Mechanical Properties of Metals.** T. Dulamită. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 375-382.

Dependence of the electrical and mechanical properties of metals on the conditions of plastic deformation and heat treatment. Analogical considerations are adduced in the mathematical analysis of these two types of properties.
(P15, Q-general, 2-64, 3-68)

252-P. Design Characteristics of Magnetic Steel Castings. W. C. Pierce. *Mechanical Engineering,* v. 80, Apr. 1958, p. 64-66.

Design and operation of magnetic clutches and brakes; induction and coercive force in magnetic devices. Use of dynamo steel, silicon and ferrocobalt; production of dynamo steel with 0.07 to 0.08% C. for improved magnetic parts.
(P16, E-general, AY, 5-60, 17-51)

253-P.* (French.) **Adsorption and Overvoltage.** Maurice Bonnemay and Gerard Lapluge. *Centre National de*

la Recherches Scientifique, Journal des Recherches, no. 39, June 1957, p. 119-124.

Adsorption in liquid phase; study of curves of polarization of platinum in relation to hydrogen.
(P13d, P15; Pt, *H*)

254-P.* (German.) **Contribution of the Binding Metals of Hard Metal Alloys to Surface Tension.** H. J. Booss. *Planseeberichte für Pulvermetallurgie,* v. 6, Apr. 1958, p. 17-21.

Wettability is one of the important properties of the iron group that determine their application to hard metal technology. The surface tension of the binding metals for hard alloys was determined under conditions that approximate those of production techniques. Additives of tungsten carbide lower the surface tension of cobalt. 23 ref.
(P13h; Co, Fe, Ni, 6-69)

255-P. (German.) **Solubility of Tungsten Carbide in Titanium Carbide.** J. Hinnuber and W. Kinna. *Technische Mitteilungen Krupp,* v. 15, no. 7, Dec. 1957, p. 155-160.

15 ref. (P12e; W, Ti, 6-69)

256-P. (German.) **Investigation of Anomalous Temperature Dependence of Initial Permeability and Magnetic After-Effect of Iron and Iron-Silicon Alloys for Temperatures Between 300 and 700° C.** H. Zahlenbrach and G. Sommerkorn. *Technische Mitteilungen Krupp,* v. 15, Dec. 1957, p. 161-164.

4 ref. (P16; Fe)

257-P. (Russian.) **Micro-Amperometric Method for Investigation of Electric Conductivity of Aluminum Oxide Coating in Moist Atmosphere.** E. I. Kmito and A. A. Kmito. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 303-306.
(P15g, 1-53; Al, 14-68)

258-P. (Russian.) **Measurement of Magnetic Susceptibility of Liquid Metals by Physico-Chemical Analysis.** A. A. Vertman and A. M. Samarin. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 309-310.

7 ref. (P16; 14-60)

259-P. (English.) **Static Electrode Potential Behavior of Tantalum and Its Behavior on Anodic Polarization.** E. M. Khairy and M. Kamal Hussein. *Chemical Society of Japan, Bulletin,* v. 30, Dec. 1957, p. 944-949.
(P15m; Ta)

260-P. Heat Capacity of Calcium From 1.8 to 4.2° K. Maurice Griffel, R. W. Vest and J. F. Smith. *Journal of Chemical Physics,* v. 27, Dec. 1957, p. 1267-1269.
(P12r; Ca)

261-P. Transverse Magnetoresistance Effect in Indium Antimonide. C. H. Champness. *Journal of Electronics and Control,* v. 4, Mar. 1958, p. 201-218.

12 ref. (P15g, P16; In, Sb)

262-P. Electrical and Thermal Properties of Bi_2Te_3. C. B. Satterthwaite and R. W. Ure, Jr. *Physical Review,* v. 108, Dec. 1, 1957, p. 1164-1170.

(P11, P15; Bi, Te)

263-P. Magnetic Properties of UMn_2. S. T. Lin and A. R. Kaufmann. *Physical Review,* v. 108, Dec. 1, 1957, p. 1171-1174.

16 ref. (P16d; U, Mn)

264-P. Magnetoresistance of Single Crystals of Copper. Roy Olson and Sergio Rodriquez. *Physical Review,* v. 108, Dec. 1, 1957, p. 1212-1218.

(P15g, P16g; Cu, Ag, Au, 14-61)

265-P. Influence of Technological Factors on Electromagnetic Properties of Cold-Reduced Transformer Steel. M. M. Ioffe, A. G. Petrenko and G. F. Chub. *Stal',* no. 10, 1957, p. 936-940. (Iron and Steel Institute Translation no. 897.)

Previously abstracted from original. See item 98-P, 1958.
(P16, 2-60, 1-73; ST, SGA-r)

266-P. (English.) **Magneto-Resistance at Low Temperatures and the Mean Free Path in Metals.** D. K. C. MacDonald. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 15-21.

(P15g; P16)

267-P. (English.) **Electrical Resistance and the Purity of Metals.** G. J. van den Berg. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 31-35.

28 ref. (P15g, 3-69)

268-P. (French.) **Influence of Crystallization of Aluminum on Electrical Conductivity at Low Temperatures.** Ph. Albert. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 40-49.

Study of zone-refined Al by conductivity tests at low temperatures. 5 ref. (P15g, M27a, 2-63; Al-a)

269-P. (French.) **Measuring Low-Temperature Conductivity of High-Purity Aluminum.** M. Caron. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 51-62.

(P15g, 1-67; Al-a)

270-P. (French.) **Measurements on Magnetic Susceptibility of Germanium.** W. Duchateau and A. Van Itterbeek. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 83-89.

(P16p, 1-54; Ge)

271-P. (French.) **Thermal Conduction and Heat Capacity of Dilute Silver Alloys at Low Temperatures.** J. DeNobel. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 97-109.

27 ref. (P11b, P12r, 2-63; Ag-b)

272-P. (French.) **On the Resistivity of Some Cu-Sb Alloys.** Ordan Pecijare and Sylvain Janssen. *Comptes Rendus,* v. 246, Mar. 10, 1958, p. 1516-1517.

(P15g; Sb, Cu)

273-P.* (French.) **Measurement of the Gyromagnetic Ratio of a Very Pure Nickel.** Andre J. P. Meyer. *Comptes Rendus,* v. 246, Mar. 10, 1958, p. 1517-1519.

Specimen of JM nickel was annealed 4 hr. at 1000° C. in hydrogen atmosphere. Measurements of gyromagnetic ratio were then made on basis of Einstein-de Haas effect. (P16; Ni-a)

274-P.* (French.) **An Anomaly in the Electrical Resistivity of Cd-Sn Alloys.** Ordan Pecijare and Sylvain Janssen. *Comptes Rendus,* Mar. 17, 1958, p. 1674-1678.

Study of resistivity as influenced by composition revealed peculiarity in domain of weak concentrations of Cd. According to accepted phase diagrams, regular variation of resistivity with concentration of Cd up to 2% in weight (alpha phase only) would be expected. Measurements showed minimum of resistivity for concentration of 1.3% Cd by weight; above this point resistivity again increases with concentrations up to 5% Cd; thenceforth it varies regularly in proportion to composition. (P15g; Sn, *Cd*)

275-P.* (German.) **Influence of Various Heat Treatments Upon the Work Hardening Properties and the Specific Electric Resistance of Soft, Rimming Basic Bessemer Steel and Carburized Pure Iron During Cold Working and During Aging Through Quenching or Deformation.** Hermann Schenck, Engen Schmidtmann and Helmut Brandis. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 761-769.

Three types of specimens examined: (1) from outside of a bar with 0.02% C, 0.01% Si, 0.25% Mn, 0.029% P, 0.012% S, 0.0054% N; (2) from the center of the same bar with 0.05% C, 0.01% S, 0.26% Mn, 0.05% P, 0.03%S and 0.0084% N; (3) carburized pure iron with 0.009% C. 17 ref.

(P15g, 2-64, Q23a; ST-g, Fe-a)

276-P.* (German.) **Investigations on the Equilibrium Points of the Systems Zirconium Oxide, Calcium Oxide and Various Iron Oxides.** Wilhelm Fischer, Anton Hoffmann and Alfred Hoffman. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 771-776.

Solubility of iron oxides in the various phases of calcium oxide, and zirconium oxide. Previous results in the two-component system of calcium oxide and zirconium oxide at 1450° C. are verified. An isothermic cross section of the system zirconium oxide, calcium oxide and iron (111) oxide at 1450° is developed. 17 ref. (P12e; Zr, Ca, Fe, 14-68)

277-P. (German.) **Electric Conductivity and Hall Constant. Pt. 8.** Werner Koster and Hans-Eberhard Schmidt. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 87-90.

(P15, Ag, Zn)

278-P.* (Polish.) **Thermodynamic Properties of Liquid Metallic Solutions. Pt. 1. The Ag-Pb System.** Janusz Terpilowski. *Archiwum Hutnictwa,* v. 2, 1957, p. 289-304.

Fourteen liquid Ag-Pb alloys with 5 to 92.5 at. % Pb investigated electrochemically by measuring the electromotive forces in reversible voltaic cells. 29 ref. (P12; Ag, Pb)

279-P. (Polish.) **Methods and Measurement of the Heat Conductivity Coefficient for Graphite and Other Carbon Materials at Temperatures up to 2000° C.** Tadeusz Senkara. *Archiwum Hutnictwa,* v. 2, 1957, p. 305-324.

25 ref. (P11h, P12; NM-k36)

280-P. (Pamphlet.) **Thermal Properties of Thirteen Metals.** C. F. Lucks and H. W. Deem. *American Society for Testing Materials, Special Technical Publication* no. 227, 1958, 30 p. $1.25.

Thermal conductivity, thermal expansion, specific heat, and density. Thermal diffusivity may be calculated from the known values of thermal conductivity, specific heat, and density. Experimental determination of these thermal properties of two grades of aluminum, chromium, copper, inconel, magnesi-

um, molybdenum, Monel K, and four grades of steel.
(P11; Al, Cr, Cu, Ni, Mg, Mo, ST)

281-P.* The Freezing Points of High-Purity Metals as Precision Temperature Standards. Pt. 3. Thermal Analyses on Eight Grades of Zinc With Purities Greater Than 99.99 + %. E. H. McLaren. *Canadian Journal of Physics,* v. 36, May 1958, p. 585-598.

Liquidus points intercompared with a precision of about 0.002° C. and alloy melting ranges examined following different rates of freezing. A melting range parameter may provide a more sensitive index of the purity than the liquidus temperature since the shape of the melting curve is strongly influenced by segregation of impurities due to coring and freezing. 12 ref.
(P12n; Zn-a)

282-P.* Thermo-Electricity at Low Temperatures. Pt. 5. Suitability of Lead as a Standard Reference Material. J. P. Jan, W. B. Pearson and I. M. Templeton. *Canadian Journal of Physics,* v. 36, May 1958, p. 627-630.

Measurements by improved method of the thermo-electric force, as a function of temperature of dilute lead alloys containing bismuth, tin, indium and cadmium in solid solutions. 4 ref. (P15, 2-63; Pb)

283-P.* Thermal Restoration of Oxygenated Germanium Surfaces. A. J. Rosenberg, P. H. Robinson and H. C. Gatos. *Journal of Applied Physics,* v. 29, May 1958, p. 771-775.

Cleaved Ge surfaces, oxygenated at room temperature, were heated under high vacuum and the restoration of their oxygen-adsorbing capacity determined. No restoration was observed at 425° C., above 575° C., however, the oxygen-adsorbing capacity of the surfaces was completely recovered. Discharge of GeO from the surface was associated with this process. The restoration process followed first-order reaction kinetics with an activation energy of 56 k-cal. per mole. Concurrently with restoration a pronounced decrease in the surface area was observed. (P13d, P13a; Ge, *O*)

284-P.* Combustion of Zirconium in Oxygen. W. L. Doyle, J. B. Conway and A. V. Grosse. *Journal of Inorganic and Nuclear Chemistry,* v. 6, no. 2, 1958, p. 138-144.

The combustion of Zr in oxygen leads to one of the highest temperatures obtainable by the combustion of metals—estimated to be 4930° K. at 1.0 atm pressure. Technique developed for operating a powdered zirconium-oxygen flame, producing the highest metal flame temperature reported to date. 16 ref. (P12; Zr)

285-P. Semiconducting Properties of Mg_2Si Single Crystals. R. G. Morris, R. D. Redin and G. C. Danielson. *Physical Review,* v. 109, Mar. 15, 1958, p. 1909-1915.

19 ref. (P15g; Mg, Si, 14-61)

286-P. Semiconducting Properties of Mg_2Ge Single Crystals. R. D. Redin, R. G. Morris and G. C. Danielson. *Physical Review,* v. 109, Mar. 15, 1958, p. 1916-1920.

(P15g; Mg, Ge, 14-61)

287-P. Physics and Chemistry of Metals. N. F. Mott. *Physical Society, Yearbook,* 1957, p. 2-13.

Physical techniques in study of the metallic bond; effect of chemical bonding forces on mechanical properties; roll of cross slip in thermal softening. 29 ref.
(P-general, Q-general)

288-P.* Volume Change of Indium Antimonide During Fusion. Norman H. Nachtrieb and Noriko Clement. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report,* Pt. 5. Mar. 1958, p. 75-81.

Determined from measurements of the change in pressure of argon at constant volume. The average of six determinations gives $100\Delta V/V_s = -13.7 \pm 0.5\%$ referred to the solid. 9 ref. (P10d, P12; In, Sb)

289-P.* Experimental Determination of the Electrical Resistivity of the Liquid Alloys, Hg-In, Hg-Tl, Ga-In, and Ga-Sn, and of Liquid Gallium. L. G. Schulz and Peter Spiegler. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report,* Pt. 12. Mar. 1958, p. 135-141.

Pure Hg was used as the reference material. The solution of In or Tl in Hg caused a large decrease in the resistivity whereas the solution of In or Sn in Ga caused a slight increase. For solutions of Tl in Hg closely corresponding to Hg_5Tl_2 at temperatures above 16° C. there were no anomalies in the electrical properties. 19 ref.
(P15g; Hg, In, Tl, Ga, Sn, 14-60)

290-P. (English.) **Effect of Impurities on the Electrical Properties of Lead Telluride.** T. L. Koval'chik and Iu.

P. Maslakovets. *Soviet Physics-Technical Physics*, v. 1, no. 11, 1957, p. 2337-2349.

15 ref. (P15, 3-69; Pb, Te)

291-P. Electrical Properties of Bismuth Alloys. Pt. 3. Ternary Alloys. "Reversion" to the Properties of Bismuth. L. I. Mokievskii and G. A. Ivanov. *Soviet Physics, Technical Physics*, v. 2, 1958, p. 1576-1585. (Translation by American Institute of Physics, Inc.)

Electrical properties of the alloys Bi-Te-Sn, Bi-Te-Pb, Bi-Sn-Se and Bi-Pb-Se. Relationships are obtained between the components of alloys consisting of elements of the IV and VI groups of the periodic table, which yield a "reversion" of the alloys to properties which are the same as those of pure Bi. The concentration of the current carriers and their mobilities are computed to Bi and in ternary "reverted" alloys. 13 ref. (P15g; Bi)

292-P. Physical Properties of Alloys and Molecular Concentration. P. A. Savintsev. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 1149-1153. (Translation by American Institute of Physics, Inc.)

8 ref. (P-general, M25m)

293-P. Work Function of Activated Alloys of CuAlMg and CuAlBe. V. N. Lepeshinskaia and V. A. Lebedeva. *Soviet Physics-Technical Physics*, v. 2, 1957, p. 1131-1139. (Translation by American Institute of Physics, Inc.)

12 ref. (P15k; Cu, Al, Mg, Be)

294-P. On the Electrical Properties of the System: Lead-Antimony. I. D. Konozenko and V. I. Ust'ianov. *Soviet Physics, Technical Physics*, v. 2, 1958, p. 1567-1575. (Translation by American Institute of Physics, Inc.)

Alloys of Pb and Sb which are formed on the basis of solutions of variable composition exhibit electrical characteristics completely definable in terms of the state of the primary solutions in the alloys. The electrical conductivity of the alloys is a function of the component concentration and the thermal state of the alloy. The temperature dependence of the electrical conductivity of a 1:1 alloy provides a sufficiently clear indication of the effect of the number of dissolved atoms (i.e., of the spots which exhibit a new short-range order) upon the magnitude and nature of the electrical conductivity. 9 ref. (P15; Pb, Sb)

295-P.* (French.) **Measurement of Magnetocaloric Effect of MnAs.** Andre J. P. Meyer and Pierre Taglang. *Comptes Rendus*, v. 246, Mar. 24, 1958, p. 1820-1822.

Additional proof of antiferromagnetism of MnAs above its polymorphic transformation at 45° C. was obtained by measurement of magnetocaloric effect in function of temperature. 5 ref. (P16d, 2-61; Mn, As)

296-P. (French.) **Near-Saturation of Polycrystalline Ferromagnetic Materials in I/H^2.** Henri Danan. *Comptes Rendus*, v. 246, Mar. 24, 1958, p. 1822-1824.

8 ref. (P16, SGA-n)

297-P.* Calculated and Observed Effects of Texture on the Magnetic Properties and Young's Modulus of Nickel Sheet. E. R. W. Jones, C. A. Clark and E. A. Fell. *British Journal of Applied Physics*, v. 9, May 1958, p. 178-184.

Experimental values for high-purity polycrystalline Ni sheet produced by powder metallurgy and annealed in purified hydrogen. Comparison between theory and experiment indicates good agreement for Young's modulus and fair agreement for magnetic properties. The textures were determined by X-ray photographic techniques. Strip possessing a cube recrystallized texture gave lower properties than recrystallized strip having a random grain orientation. 9 ref. (P16, Q21a, M26c; Ni, 4-53)

298-P.* The High Temperature Stability of Permanent Magnets of the Iron-Nickel-Aluminum System. A. G. Clegg and M. McCaig. *British Journal of Applied Physics*, v. 9, May 1958, p. 194-199.

Open circuit magnetization of rectangular bars of various modern permanent magnet alloys measured at temperatures up to 550° C. Differential ballistic method used. After magnetization at room temperature, both reversible and irreversible losses occur on heating. These losses vary with material and dimension ratio and in an attempt to explain these variations demagnetization curves at 500° C. have been measured. 7 ref. (P16, 2-62; Fe, Ni, Al, SGA-n)

299-P. Some Magnetic Properties of Dilute Anisotropic Ferromagnetic Al-

loys. W. Sucksmith. *Electrical Research Association,* Technical Report N/T74, 1956, 8 p.

Magnetic properties of very small particles of iron which are precipitated out of dilute solid solutions in copper. Apparatus for measuring remanence and coercivity in the very low intensities of magnetization encountered. 10 ref.
(P16, X26; Fe)

300-P.* Majority Carrier Lifetime in Copper Doped Germanium at 20° K. D. A. H. Brown. *Journal of Electronics and Control,* v. 4, Apr. 1958, p. 341-349.

The time constant for recombination of a hole with a negatively charged Cu impurity center in Ge at 20° K. is derived from experimental data from two independent methods based on measurement of (*a*) the photoconductive sensitivity and (*b*) the semiconductor shot noise. Both methods give good agreement in order of magnitude, but the theoretical values are several orders of magnitude greater. 11 ref. (P15; Ge, *Cu*)

301-P.* Irradiation Damage and Recovery in Molybdenum and Tungsten. G. H. Kinchin and M. W. Thompson. *Journal of Nuclear Energy,* v. 6, May 1958, p. 275-284.

Specimens irradiated with pile neutrons at 30° C. and at −196° C. Recovery of the increase in resistivity studied; activation energies of 0.25 and 1.3 eV for Mo and 0.5 and 1.7 eV for W. A stored energy release of 0.4 cal. per g. from 50 to 250° C. also observed from Mo irradiated with 1.3 x 10^{19} n. per sq. cm. 9 ref.
(P13a, P15g, 2-67; Mo, W)

302-P. Mass Transfer in Liquid Metal Systems. Pt. 2. Isothermal Transfer. J. W. Taylor. *Nuclear Power,* no. 3/6, Mar. 1958, p. 101-105.

12 ref. (P10d; 14-60)

303-P.* The Lattice Thermal Conductivity of a Gold-Platinum Alloy. J. A. Birch, W. R. G. Kemp and P. G. Klemens. *Physical Society Proceedings,* v. 71, May 1, 1958, p. 844-845.

Thermal and electrical conductivities of a 98% Au, 2% Pt alloy over a wide range of low temperatures measured and the lattice thermal conductivity from 2-90° K. deduced. 7 ref. (P11h, P15, 2-63; Au, *Pt*)

304-P. Thermal Expansion of Rare Earth Metals. Fred Barson, S. Legvold and F. H. Spedding. Iowa State College. *U. S. Atomic Energy Commission,* ISC-831, June 1956, 71 p. (Order from Office of Technical Services, Washington 25, D. C.) $2.

High-temperature dilatometric investigation; coefficients of expansion; evidence of crystalline transformations which may occur; light cast on certain high-temperature transitions already discovered in several of the metals. Metals investigated were lanthanum, cerium, praseodymium, neodymium, gadolinium, terbium, dysprosium, erbium and ytterbium. 82 ref. (P11g; EG-g)

305-P. Irradiation Effects in Uranium. S. H. Bush. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 591-615.

Mechanical properties such as hardness, bend and tensile data are reviewed. Variables considered include burn-up, irradiation temperature, U^{235} content, composition (to 3 wt. % alloy), post-irradiation annealing and tensile testing temperature. Drastic reductions in ductility occur at burn-ups as low as 0.02 at. %. Recovery of damage is limited on post-irradiation annealing. Changes in such physical properties as density, thermal conductivity, electrical resistivity and modulus of elasticity are reported. Effect of irradiation on microstructure. 45 ref.
(P-general, Q-general, M27, 2-67; U)

306-P. (English.) **Electrical Properties of Ag_2Te.** Shin-ya Miyatani. *Physical Society of Japan, Journal,* v. 13, Apr. 1958, p. 341-350.

10 ref. (P15; Ag, Te)

307-P.* (French.) **Measurement of Variation of Coercive Force in Function of Angle in Nickel Films Condensed in Vacuo.** A. Van Itterbeek and A. Dupre. *Journal de Physique et le Radium,* v. 19, Feb. 1958, p. 113-118.

Coercive force of evaporated Ni and Co films determined by measurement of magnetoresistance. Evaporation apparatus described. Thickness of films determined by optical method. Coercive force as function of angle between normal to plane of film and direction of magnetic field. Change of coercive force as function of temperature. (P16; Ni, Co, 14-62)

308-P* (Russian.) **Thermo-Electronic Emission From Binary Alloys During Process of Formation.** K. F. Voitsekhovskii. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 3-7.

The effect on the current of themo-electronic emission was studied while the atomic arrangement in a crystalline lattice of binary alloys was changing. Richardson's basic formula was confirmed and the problem of dependence of Richardson's constant on the range of S and concentration of C in case of cubic and other crystalline lattices was examined. This mathematical analysis is submitted for discussion. 10 ref. (P15k)

309-P.* (Russian.) **The Nonlinear Theory of Transitional Processes in Ferromagnetic Layers Magnetized by Longitudinal Alternating Poles.** N. N. Zatsepin. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 30-36.

The problem was examined mathematically. With the help of small parameters the problem of finding electromagnetic parameters for transition processes in homogeneous layers was resolved. In particular an expression was found for distribution of magnetic pole, induction and permeability of thicker layers, when magnetic poles of rectangular impulse were acting upon them. Numerical values are expressed for linear and nonlinear members. 6 ref. (P16)

310-P.* (Russian.) **Ferromagnetic Phase in Austenitic Heat Resistant Steel, Type 14-14.** V. Z. Tseitlin. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 37-43.

Ferromagnetic alpha phase may have place in the structure of austenitic steels. It appears not only in the process of aging, but also as result of annealing after hardening, and disappears under definite conditions. It develops along grain boundaries and around individual carbides. Development of ferromagnetic phase under plastic deformation when gamma-alpha transformation is brought about by nondiffusion. 4 ref. (P16; SS)

311-P.* (Russian.) **Determination of Atom Distribution Density in Liquid Al and Bi by Means of Distinctive Temperatures Determined by Electronographic Data.** A. I. Bublik and A. G. Buntar. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 53-57.

The density of radially distributed atoms was plotted against temperature. The quantity of the nearest atoms was determined at various temperatures. In liquid Al at fusion temperature the nearest sequence appears to be basic as well as crystalline. The density of particles diminishes at higher temperatures. In Bi, particles are arranged at near crystallization temperature in same order as in solid state. At high temperatures, Al and Bi approach medium density. 6 ref. (P12, M25; Al, Bi, 14-60)

312-P. Electric Properties and Applications of Silicon Carbide. N. P. Bogoroditskii, V. V. Pasunkov, G. F. Kholuianov and D. A. Ias'kov. *Academy of Sciences of the USSR, Bulletin,* v. 20, no. 12b, 1957, p. 1440-1447. (Translation by Columbia Technical Translations, Inc.)

Study of application of silicon carbide as main component in waveguides, miniature nonlinear resistors for automatic equipment and integral-formed ignition electrodes of high mechanical strength. 14 ref. (P15, T1; Si, NM-a35)

313-P. Metallurgical Aspects of Nuclear Power Engineering. Pt. 1. J. C. Wright. *Engineer,* v. 205, Apr. 25, 1958, p. 613-615.

Basic metallurgy associated with nuclear power reactors, with emphasis on both gas-cooled and liquid-cooled reactors. Physical metallurgy of fissile fuel metals U, Pu and Th.

(P-general, T11, 17-57; U, Pu, Th)

314-P. Metallurgical Aspects of Nuclear Power Engineering. Pt. 2. J. C. Wright. *Engineer,* v. 205, May 2, 1958, p. 658-660.

Behavior of fissile metals under irradiation; scattering; absorption; annealing of radiation damage; radiation effects and radiation growth of U. 9 ref. (P18, T11g, 2-67; U)

315-P. On the Periodic Relationship of Electrode Potentials of Metals in Fused Salts. Yu. K. Delimarsky. *Journal of General Chemistry of the USSR,* v. 26, 1957, p. 3303-3306. (Translation by Consultants Bureau, Inc.)

10 ref. (P15j)

316-P.* Radiation Effects in Magnetic Materials. D. I. Gordon, R. S. Sery and R. E. Fischell. *Nucleonics,* v. 16, June 1958, p. 73-77.

Almost all magnetic materials show deterioration but magnitudes vary considerably. One material was improved by radiation. Magnetic properties are insensitive to all types of radiation except fast neutrons. 22 ref. (P16, P17; SGA-n)

317-P. Resistivity Due to Dislocations in Copper. Walter A. Harrison. *Physics and Chemistry of Solids,* v. 5, no. 1/2, 1958, p. 44-46.

Scattering of electrons by a dislocation with a hollow core. Effect of such a core upon the electrical resistivity may be many times greater than the effect of the strain field. 10 ref. (P15g, M26b; Cu)

318-P.* Optical Properties of Semiconductors Under Hydrostatic Pressure. Pt. 1. Germanium. William Paul and D. M. Warschauer. *Physics and Chemistry of Solids,* v. 5, no. 1/2, 1958, p. 89-101.

The room-temperature absorption spectrum of high-purity single-crystal Ge measured between absorption coefficients of 1 and 100 at hydrostatic pressures up to 7000 kg. per sq. cm. Results interpreted to give a pressure coefficient for the optical energy gap in satisfactory agreement with the more precise value determined from measurement of the intrinsic resistivity as a function of pressure. 16 ref.
(P17, 3-74; Ge, 14-61)

319-P.* Optical Properties of Semiconductors Under Hydrostatic Pressure. Pt. 2. Silicon. William Paul and D. M. Warschauer. *Physics and Chemistry of Solids,* v. 5, no. 1/2, 1958, p. 102-106.

The pressure coefficient of the optical absorption edge due to indirect transitions has been measured in Si over a pressure range of 1-8000 kg. per sq. cm. 9 ref.
(P17, 3-74; Si)

320-P. Variation of Resistivity According to Thickness for Thin Layers of Lead. F. Ciorascu, A. Deveny, M. Nachman and M. Oncescu. *Revue de Physique,* v. 2, no. 2, 1957, p. 199-208.

19 ref. (P15; Pb)

321-P. Dilatometric Determination of the Coefficient of Expansion of Alpha-Uranium. *Soviet Journal of Atomic Energy,* v. 3, no. 9, 1957, p. 1074-1075. (Translation by Consultants Bureau, Inc.)

Dilatometric studies conducted with a differential dilatometer in a vacuum and a pyrox standard. Heating and cooling rate for cycles up to 630° C. was 150° C. per hr. Isotropic specimens exhibit the same behavior independently of their origin, with very small variation of the expansion coefficient. The dilatometric curves showed good reproducibility, which was not the case for U with preferred orientation because of "thermal coupling". 4 ref. (P11g; U)

322-P. On the Change of Electrical Resistivity in Elementary Dislocation Generation. E. D. Shchukin, V. N. Rozhanskii and Iu. V. Goriunov. *Soviet Physics,* v. 2, 1957, p. 420-422. (Translation by American Institute of Physics, Inc.)

(P15g; Cd, Zn)

323-P. Equilibrium and Nonequilibrium Electrical Properties of Polycrystalline Selenium. P. T. Kozyrev. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 27-34. (Translation by American Institute of Physics, Inc.)

8 ref. (P15; Se)

324-P. Some Features of the Electrical Properties of HgSe-HgTe Films. O. D. Elpat'evskaia and A. R. Regel'. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 35-39. (Translation by American Institute of Physics, Inc.)

14 ref.
(P15, M24c; Hg, Se, Te, 14-62)

325-P. An Investigation of the Thermo-Electric Properties of Lead Selenide and Lead Telluride. N. V. Kolomoets, T. S. Stavitskaia and L. S. Stil'bans. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 59-66. (Translation by American Institute of Physics, Inc.)

(P15, 2-61; Pb, *Se, Te,* 14-68)

326-P. Thermal and Thermo-Electric Properties of Alloys of Silicon With Transition Metals. P. V. Gel'd. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 95-99. (Translation by American Institute of Physics, Inc.)

Study of thermo-electromotive force, conductivity, coefficients of expansion and specific heats of alloys of Si with Fe, Cr and Mn.
(P11g, P11h, P12r, P15g; Si, *Fe, Cr, Mn*)

327-P. Electrical Properties of the Intermetallic Compound CdSb. I. M.

Pilat. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 100-103. (Translation by American Institute of Physics, Inc.)

(P15; Cd, Sb)

328-P. Production and Investigation of Intermetallic Compounds in Thin Films. V. A. Presnov and V. F. Synorov. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 104-107. (Translation by American Institute of Physics, Inc.)

13 ref. (P15; Al, Sb, In, Sb, Ga, Sb, 14-62)

329-P. On Intermetallic Alloys of Platinum and Gold With Alkali and Alkaline Earth Metals. I. L. Sokol'skaia. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 108-110.

Electrical conductivity and electrical and thermo-electric properties of the systems Na-Au, Na-Pt and Ba-Pt. 7 ref. (P15; Au, Ba, Na, Pt)

330-P. Galvanomagnetic Properties of Tellurium at Low Temperatures. Pt. 1. S. S. Shalyt. *Soviet Physics, Technical Physics,* v. 2, no. 1, 1957, p. 166-178. (Translation by American Institute of Physics, Inc.)

13 ref. (P15, P16, 2-63; Te)

331-P. Motion of Minority Carriers in Germanium. M. Shtenbeck and P. I. Baranskii. *Soviet Physics, Technical Physics,* v. 2, no. 2, 1957, p. 195-204. (Translation by American Institute of Physics, Inc.)

Investigation of the motion of minority carriers injected by an ordinary emitter into a single crystal block of n-type Ge. Analysis of the damping, phase shift and deflection of the hole current in a magnetic field, modulated by frequency, and registered by an ordinary collector enabled accurate determination of time of flight, mobility and longitudinal and transverse diffusion coefficients of the minority carriers. 8 ref. (P15g, P16; Ge)

332-P.* (Czech.) **Physical Metallurgy of Uranium. Influence of Irradiation.** Bohumil Prenosil. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 320-324.

Basic requirements for nuclear fuel elements formulated on the basis of data. Mechanism of reactions existing during irradiation in the operation of the reactor; changes of physical, mechanical and structural properties of U and surface phenomena such as surface sprinkling, shape modification and volume growth as consequence of irradiation. 17 ref.
(P10d, Q-general; U, 2-67)

333-P. (German.) **Metal Sheets and Strips for the Electrical Industry.** H. Hesselbach. *Industrie Anzeiger,* v. 80, Jan. 17, 1958, p. 16-19.

Electric properties of electro-sheet, the alloys used and influence of the degree of purity with which values of the magnetic properties increase. Magnetic anisotropy and influence of hot and cold rolling upon quality and processing. Survey of types and qualities available.

(P15, P16, T1, 17-57; ST, *Si*)

334-P.* (German.) **Possibilities of Influencing the Physical Properties of Ferromagnetic Materials.** H. Jahn. *Die Technik,* v. 13, Feb. 1958.

Influencing of radioactive rays or magnetic fields. Samples treated in magnetic field showed noticeable differences in hardness, notch impact and tensile strength as compared with normally annealed samples, especially in low-carbon steels. Tests with greater cooling speeds showed mostly negative effects. Improvements in notch impact were obtained with high carbon contents. Influence of magnetic field treatment on properties of a Cr alloy steel. Tests indicate possibility of dispensing with expensive alloy components, by improvement of the properties of carbon steels in magnetic fields. 23 ref.

(P16, J-general, Q-general; CN)

335-P.* (Russian.) **Residual Electro-Resistance in Binary System of Metallic Alloys.** N. V. Grum-Grzhimailo. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 23-29.

Dependence of electro-resistance of binary alloys on their composition is not satisfactorily explained. The electrical conductivity theory proposed by Blokh and Nordheim does establish this dependence for the homogeneous phase of univalent alloys. A series of experiments on different alloys disproved Nordheim's formula of interpolation. 15 ref. (P15g, 2-60)

336-P.* (Russian.) **Comparative Measurement of Vapor Pressure of Chromium and Iron by Speed of Vaporization in Vacuum.** V. D. Burlakov, *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 91-101.

When heated together through a wide range of temperatures Cr and

Fe vaporize at the same intensity. To clarify this phenomenon experiments were carried out separately for Cr and Fe. The open surfaces of the metals were vaporized in vacuum and the quantity of evaporation was determined either by the thickness of the evaporated layer, or by weighing the sample and the condensate. The results were analyzed mathematically. 12 ref. (P12c; Cr, Fe)

337-P.* (Russian.) **Problem of Latent Energy of Deformation in Solid Solutions.** V. E. Panin and V. G. Milevskaya. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 120-126.

Latent energy of deformation in solid solutions of Cu-Ni system varies with the amount of fusion along the curve, with the maximum value at the mean region of concentration. This is dependent on the change in hardness, electrical resistance, dynamic coefficient, thermal electromotive force and other properties depending on composition. 9 ref. (P12; Cu, Ni, 14-67)

338-P. Scientists Develop "Four-Way" Magnetic Steel. *Electrical Engineering,* v. 77, Jan. 1958, p. 106-108.

Cube-oriented Si-Fe.

(P16; AY, *Si,* SGA-n)

339-P. Nickel Powder With Adsorptive Properties Approaching Those of Evaporated Nickel Films. M. W. Roberts and K. W. Sykes. *Faraday Society, Transactions,* v. 54, Apr. 1958, p. 548-556.

Surface of Ni powder studied by measurement of hydrogen and krypton adsorption throughout the course of reduction in hydrogen for 102 hr. at 450° C. Adsorptive behavior closely approaches that of evaporated Ni films because of improvement in surface purity. This is attributed to removal of surface oxide by reduction and of involatile impurities by aggregation into separate phases of diffusion into the lattice. 11 ref. (P13d; Ni, 6-68)

340-P. Properties of Silicon and Germanium. Pt. 2. E. M. Conwell. *IRE Proceedings,* v. 46, June 1958, p. 1281-1300.

Important advances since 1952; bibliography. 117 ref.

(P-general, Q-general; Si, Ge)

341-P. Silicon Nitrides: Some Physico-Chemical Properties. E. T. Turkdogan, Patricia M. Bills and Valerie A. Tippett. *Journal of Applied Chemistry,* v. 8, May 1958, p. 296-302.

18 ref. (P-general; Si, 14-68)

342-P. Uniaxial Magnetic Anisotropy Induced in Fe-Ni Alloys by Magnetic Anneal. Eric T. Ferguson. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 252-253.

Anisotropy determined as a function of the composition, annealing temperature and duration. Result is consistent with the Néel-Taniguchi theory. 7 ref. (P16, J23; Fe-b, Ni-b)

343-P. Effects of Magnetic Fields Upon Anisotropic Iron Crystals. John H. L. Watson, Anthony Arrott and Michael W. Freeman. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 306-308.

Problems inherent in magnetic alignment of alpha iron crystals explained by electron microscopic observation of the behavior of the single domain crystals under the effect of magnetic fields. With these specimens, which possess a fraction of magnetically unfavorable dendrites, intrinsic coercive forces of over 1700 oersteds have been measured without alignment. (P16, M21e; Fe, 14-61)

344-P. Heats of Formation of Alpha-Phase Silver-Cadmium Alloys. Raymond L. Orr, Alfred Goldberg and Ralph Hultgren. *Journal of Physical Chemistry,* v. 62, Mar. 1958, p. 325-327.

Heats of formation at 308° K. determined by liquid tin solution calorimetry for a series of alloys covering the alpha-phase of the Ag-Cd alloy system. (P12r, X24e; Ag-b, Cd-b)

345-P. Experiments Using a Simple Thermal Comparator for Measurement of Thermal Conductivity, Surface Roughness and Thickness of Foils or of Surface Deposits. R. W. Powell. *Journal of Scientific Instruments,* v. 34, Dec. 1957, p. 485-492.

Two metal balls are similarly mounted in a block of balsa wood, but one is at a slightly lower level so that it touches any surface on which the block rests. After heating to a small fixed temperature excess the block is laid in contact with the test surface. Differentially connected thermocouples attached to each ball measure the increased rate of cooling of the ball which makes contact. The differential e.m.f. observed after contact is made is shown to be a function of the thermal conductivity of the material on which the ball rests. 8 ref. (P11h, S14c, S15c, 1-53)

346-P. Measurements of Total Hemispherical Emissivity of Various Oxidized Metals at High Temperature. William R. Wade. *National Advisory Committee for Aeronautics,* Technical Note 4206, Mar. 1958, 43 p.

Stainless steel, mild steel, Ti, Ti alloy, Cu, Al, Mo and Ta. 5 ref.
(P17d; SS, ST, Ti, Cu, Al, Mo, Ta)

347-P. The Magnetic Susceptibility and Electrical Resistivity of Some Transition Metal Silicides. D. A. Robins. *Philosophical Magazine,* v. 3, Apr. 1958, p. 313-327.

18 ref. (P15g, P16)

348-P. Galvanomagnetic Effects in n-Type Indium Antimonide. H. P. R. Frederikse and W. R. Hosler. *Physical Review,* v. 108, Dec. 1, 1957, p. 1136-1145.

(P16, P15; In, Sb, 14-68)

349-P. Galvanomagnetic Effects in p-Type Indium Antimonide. H. P. R. Frederikse and W. R. Hosler. *Physical Review,* v. 108, Dec. 1, 1957, p. 1146-1151.

36 ref. (P16, P15g; In, Sb, 14-68)

350-P. Superconducting Transition of Lead. W. B. Pearson and I. M. Templeton. *Physical Review,* v. 109, Feb. 15, 1958, p. 1094.

(P15g; Pb)

351-P.* Galvanomagnetic Effects in n-Type Bismuth Telluride. J. R. Drabble, R. D. Groves and R. Wolfe. *Physical Society Proceedings,* v. 71, Mar. 1, 1958, p. 430-443.

The resistivity, Hall coefficients and low-field magnetoresistance coefficients associated with current flow in the cleavage planes are measured at 77° K. on a number of n-type specimens of bismuth telluride. 7 ref. (P15, P16; Bi, Te, 14-68)

352-P.* Magnetoresistance of n-Type InSb at 4.2° K. R. F. Broom. *Physical Society Proceedings,* v. 71, Mar. 1, 1958 p. 470-475.

Negative magnetoresistance in n-type InSb at 4.2° K. investigated for several specimens prepared by different techniques from single crystals of differing purity. Results indicate that this phenomenon is not a bulk property of the material but is largely due to the method of preparation of the specimens. Oscillations in the magnetoresistance as a function of magnetic field have been observed in samples having a balanced donor concentration of less than 10^{16} cc. 9 ref.
(P16, 2-63; In, Sb)

353-P.* The Resistivity of Ordered Au_3Cu. P. Wright and K. F. Goddard. *Physical Society Proceedings,* v. 71, Mar. 1, 1958, p. 506-508.

Isothermal decrease in resistivity with time at temperatures below 190° C. and an equilibrium resistance-temperature curve showing an increase in resistivity as the temperature approaches 190° C., followed by a decrease at lower temperatures. 7 ref.
(P15g, 2-61; Au, Cu, 14-68)

354-P. Boltzmann Equation in the Theory of Electrical Conduction in Metals. D. A. Greenwood. *Physical Society Proceedings,* v. 71, Apr. 1, 1958, p. 585-596.

10 ref. (P15g)

355-P. The Thermal Conductivity of Tin-Indium Alloys in the Normal State. C. A. Shiffman. *Physical Society Proceedings,* v. 71, Apr. 1, 1958, p. 597-607.

19 ref. (P11h; Sn, In)

356-P.* Electrical Conductivity and Thermo-Electric Power of Bismuth Telluride. H. J. Goldsmid. *Physical Society Proceedings,* v. 71, Apr. 1, 1958, p. 633-646.

Electrical conductivity and thermo-electric power of the semiconductor Bi_2Te_3 measured between 150 and 300° K. Variation of carrier mobility with temperature; energy dependence of the relaxation time, as well as other semiconductor parameters. 25 ref.
(P15g; Bi, Te, EG-j)

357-P.* Properties of p-Type Indium Antimonide. Pt. 1. Electrical Properties. C. Hilsum and R. Barrie. *Physical Society Proceedings,* v. 71, Apr. 1, 1958, p. 676-685.

Dependence of electron and hole mobilities on carrier concentration is determined for p-type indium antimonide with impurity concentrations ranging from 10^{14} to 2×10^{17} cc. Method used was the analysis of variation of Hall coefficient and resistivity with a magnetic field. Good agreement is obtained with a simple theory, which assumes that the carrier relaxation time is independent of energy. 11 ref.
(P15, In, Sb, EG-j)

358-P. The Thermal Conductivity of Lead at Low Temperatures. H. Montgomery. *Royal Society, Proceedings,* v. 244, Feb. 1958, p. 85-100.

27 ref. (P11h, 2-63; Pb)

359-P.* The Surface Tension of the Binary Metal Alloys, Pb-Sn, Bi-Pb, Bi-Sn and Bi-Cd. R. V. Bakradze and B. Ya. Pines. *United Kingdom Atomic Energy Authority,* AERE Lib/Trans. 727, 1957, 12 p.

The concentration and temperature dependence of surface tension of liquid alloy systems Pb-Sn, Bi-Pb, Bi-Sn and Bi-Cd at temperatures up to 550° C. determined experimentally. Temperature dependence of all the alloys was practically linear. The concentration relation of surface tension, however, differed substantially from the linear. 5 ref. (P13h, 2-61; Pb, Sn, Bi, Cd)

360-P. Electrostatic Emission From a Tantalum Single Crystal. N. A. Gorbatyi, L. V. Reshetnikova, E. P. Sytaia and G. N. Shuppe. *Soviet Physics, Technical Physics,* v. 2, no. 2, 1957, p. 262-265. (Translation by American Institute of Physics, Inc.)

10 ref. (P15k; Ta, 14-61)

361-P. Recombination Centers in Germanium After "Low-Temperature" Heat Treatment. T. V. Mashovets and S. M. Ryvkin. *Soviet Physics, Technical Physics,* v. 2, no. 2, 1957, p. 210-212. (Translation by American Institute of Physics, Inc.)

8 ref. (P15, 2-64; Ge, Cu)

362-P. Probability of Recombination Capture of Charge Carriers by Frenkel Defects in n-Type Germanium. L. S. Smirnov and V. S. Vavilov. *Soviet Physics, Technical Physics,* v. 2, no. 2, 1957, p. 387-388. (Translation by American Institute of Physics, Inc.)

8 ref. (P15; Ge)

363-P. Investigation of the Mechanical and Magnetic Properties of Fe-Ni-Al Alloys for Peremanent Magnets. A. A. Shekalov and Ya. I. Shtreis. *Metallovedenie i Obrabotka Metallov,* v. 4, Apr. 1958, p. 29-38. (Henry Brutcher, Altadena, Calif., Translation no. 4185.)

The mechanical properties of the ternary Fe-Ni-Al alloys and quaternary alloys with Cu and the effect of sulphur, Ti and Li additions on the mechanical and magnetic properties of these alloys were studied with the aid of microscopic analysis and rupture, bending and hardness tests. 4 ref.

(P16, Q-general; SGA-n)

364-P. Physico-Chemical Analysis of Some Semiconductor Systems. N. Kh. Abrikosov. *Academy of Sciences of the USSR, Bulletin of,* v. 21, no. 1, 1957, p. 136-139. (Translation by Columbia Technical Translations, Inc.)

Study of Cr-Sb, Co-Sb, Fe-Si and Bi-Te semiconductor systems in wide range of concentrations and after various heat treatments. 10 ref. (P15g; Cr-b, Sb-b, Co-b, Fe-b, Bi-b, Te-b)

365-P. (German.) **Temperature Coefficient of the Initial Permeability of Powder Core Material.** H. Henniger. *Nachrichtentechnik,* Feb. 1958, p. 66-75.

26 ref. (P11, P16; 6-72)

366-P. (German.) **Chemical Problems in the Study of Semiconductors. Pt. 2. Germanium and Silicon.** E. Gastinger. *Osterreichische Chemiker-Zeitung,* v. 59, Mar. 1958, p. 70-77.

84 ref. (P15g; Ge, Si)

367-P. (German.) **Magnetic Characteristics of Rare Earth Metals at Very Low Temperatures.** Hugo Leipfinger. *Zeitschrift für Physik,* v. 150, Mar. 10, 1958, p. 415-435.

46 ref. (P16, 2-63; EG-g)

368-P. (Japanese.) **Electrical Resistance of Dumet Wire.** Tetuya Arizumi, Totaro Haida and Yoichi Ueda. *Japan Journal of Applied Physics,* v. 27, Apr. 1958, p. 224-228.

The wire is assumed to consist of parallel resistances of Cu, brass and Ni-Fe alloy. The change of resistance of the wire by heat treatment is measured by means of a double bridge and potentiometer. 5 ref. (P15g, S11g, T1b; Cu, Cu-n, Fe, Ni, 4-61)

369-P. (Russian.) **Effect of Aluminum on Specific Losses of Transformer Steel.** N. F. Dubrov. *Stal',* v. 18, Mar. 1958, p. 246-248.

Aluminum should not be added to transformer steel which is annealed at high temperature during either deoxidation or in alloying with ferrosilicon. 4 ref.

(P16; ST, *Si, Al,* SGA-n)

370-P.* Surface Tension of Titanium, Zirconium, and Hafnium. A. W. Peterson, H. Kedesdy, P. H. Keck and E. Schwarz. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 213-216.

Surface tensions of Ti, Zr and Hf at their melting points measured in pure argon atmosphere by drop-weight method. A uniform longitudinal field induction coil was used to melt the sample rod tip. The

average values obtained were 1390 ± 40, 1400 ± 40 and 1460 ± 40 dynes per cm., respectively.
(P13h; Ti, Zr, Hf)

371-P.* Nature of Electrical Resistivity of the Ferromagnetic Metals at Low Temperatures. E. Kondorsky, O. S. Galkina and L. A. Tchernikova. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 243-246.

Resistivity of Ni, Fe and Ni-Cu alloys with Cu up to 25% at temperatures from 2 to 78° K. Empirical formulas.
(P15g, 2-63; Ni, Fe, *Cu*)

372-P.* Flux Reversal in Thin Films of 82% Ni, 18% Fe. C. D. Olson and A. V. Pohm. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 274-282.

Magnetization reversal process of Fe-Ni films (nominally 82% Ni, 18% Fe) deposited in the presence of a magnetic field to a thickness of about 1000 to 4000 Å. Experimental results indicate at least two different magnetization reversal mechanisms. The first, characterized by relatively long remagnetization periods, involves domain-wall movement; the second, characterized by relatively short remagnetization periods, is consistent with the rotation of the magnetization in the plane of the film. 17 ref.
(P16; Ni-b, *Fe,* 14-62)

373-P.* Domain-Wall Structure in Permalloy Films. E. E. Huber, D. O. Smith and J. B. Goodenough. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 294-295.

Domain-wall structure in Permalloy films in thickness range 25 to 2000 Å studied by the Bitter technique. A new type of 180° wall has been observed; the main wall is cut at regular intervals by short, right-angle "cross ties" which terminate in free, single ends. The cross-tie period and length are dependent on film thickness, each becoming shorter with decreasing thickness. These patterns can be understood in terms of a new model for the structure of domain walls in thin films of low-anisotropy material. (P16c; SGA-n)

374-P.* Physical and Magnetic Properties of Elongated Single-Domain Iron and Iron-Cobalt Permanent Magnets. R. C. Lever, E. J. Yamartino and R. B. Falk. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 304-306.

Physical and magnetic properties of permanent magnets compacted from elongated single-domain particles with metal and organic matrices. Their unique properties which make possible novel design and application possibilities include: demagnetization curve flexibility; high-energy and energy-to-weight ratio; uniformity of pole face flux; low-temperature coefficient of remanence, precise dimensional tolerances; excellent machinability; solderability; low critical material content; and short radioactive half-life. (P16; Fe, Co, SSA-n)

375-P.* Loss of Exchange Coupling in the Surface Layers of Ferromagnetic Particles. F. E. Luborsky. *Journal of Applied Physics,* v. 29, Mar. 1958, p. 309-310.

Experiments with spherical Fe particles 28 to 265 Å in diameter demonstrate that the proposed nonferromagnetic surface layer on an Fe particle must be less than 1 Å thick (i.e., about one atomic radius). This conclusion is based upon a comparison of the ferromagnetic Fe calculated from the magnetic saturation, and the total amount of Fe as determined by chemical analysis. 7 ref. (P16; Fe)

376-P.* Heats of Formation of Liquid Alloys at 1100° by a Simple Reaction Calorimeter. R. A. Oriani and W. K. Murphy. *Journal of Physical Chemistry,* v. 62, Feb. 1958, p. 199-202.

Design and operation of a high-temperature reaction calorimeter capable of ± 10% accuracy. Enthalpies of formation at 1100° of liquid Ag-Au, Ag-Cu and Au-Ni alloys from their liquid components. Similarity between the interactions in the liquid solution and those in the solid solution.
(P12r; Ag, Au, Cu, Ni, 14-60)

377-P.* The Thermal and Electrical Resistivity of Bismuth and Antimony at Low Temperatures. G. K. White and S. B. Woods. *Philosophical Magazine,* v. 3, Apr. 1958, p. 342-359.

Electrical resistivity of pure polycrystalline specimens of Bi and Sb over the range 2 to 300° K. and thermal conductivity up to 150° K. Some measurements made in a magnetic field allow separation of the thermal conductivity into electronic and lattice components. Below 50° K., it appears that the heat

conductivity of Bi is nearly all due to lattice waves; free electrons seems to contribute little to the conduction or to the scattering. In Sb, however, the lattice conductivity is smaller than might be expected at low temperatures suggesting significant scattering by free electrons. (P11h, P15g, 2-63; Bi, Sb)

378-P.* Superconductivity of Thorium Below 1° K. Norman M. Wolcott and Robert A. Hein. *Philosophical Magazine,* v. 3, June 1958, p. 591-596.

Critical magnetic field of thorium determined between 0.1° K. and 1.37° K., the transition temperature, where the initial slope of the critical field curve is 190 gauss per degree. The data indicate a value of 162 gauss for the critical field at absolute zero. The critical field curve departs from a parabola near the transition temperature. 6 ref. (P15g, 1-63; Th)

379-P.* Characteristics of the Additional Conductivity Induced in Single-Crystal Cadmium Selenide by X-Irradiation. Pt. 2. Kinetic Aspects. S. V. Svechnikov. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 2328-2331. (Translation by American Institute of Physics, Inc.)

Rate of photocurrent rise in single-crystal cadmium selenide studied as a function of X-ray intensity, wave length and intensity of illumination and field and temperature of the specimen. The conductivity kinetics are explained by impurities, and by double optical space-charge currents assignable to transitions. (P15g, 2-67; Cd, 14-61)

380-P. Characteristics of the Additional Conductivity Induced in Single-Crystal Cadmium Selenide by X-Irradiation. Pt. 1. Static Characteristics. S. V. Svechnikov. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 2320-2327. (Translation by American Institute of Physics, Inc.)

The voltage-current and dosimetric characteristics of CdSe single crystals on X-irradiation. Both are super-linear. Experimental observations are explained satisfactorily by supposing a space change to exist in the crystal and adopting Lashkarev's double optical transitions. 13 ref. (P15g, 2-67; Cd, 14-61)

381-P. (French.) **Reactivity of Metallurgical Slag Constituents. Its Relation to Thermodynamic Activity and the Constitution of Melted Silicates.** Traian T. Negresco. *Revue de Métallurgie,* v. 3, no. 1, 1958, p. 5-40.

Effect of temperature, atmospheric oxygen and sulphur content on the modifications undergone by the compositions of a large series of ternary synthetic slags of the type SiO_2-CaO-Al_2O_3, SiO_2-CaO-MgO, SiO_2-CaO-FeO, SiO_2-MgO-FeO, etc. 13 ref. (P12; RM-q)

382-P. (Russian.) **Experimental Investigation of the Viscosity of Basic Martensite Slags. Pt. 1. Viscosity and Electrical Conductivity of Basic Slags Under Laboratory Conditions.** Iosif Tripsha. *Revue de Métallurgie,* v. 3, no. 1, 1958, p. 41-60.

Empirical formulas developed for computing the effect of temperature and chemical composition on the viscosity of martensitic basic slags and the relation between the viscosity and the electrical conductivity. 15 ref. (P10f, P15g; RM-q)

383-P.* Study of the Distortion of High-Carbon High-Chromium Die Steels. K. Sachs. *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 216-224.

Test reveals the influence of carbide distribution on the susceptibility to distortion. Accentuated distortion resulting from a longitudinal temperature gradient emphasizes the importance of even temperature distribution in the hardening furnace. 7 ref.
(P10d, W24n, 2-64; TS-b, Cr)

384-P.* (English.) **Magnetic Annealing Effect in 2% Cobalt-Copper Alloy. Pt. 1. Induced Ferromagnetic Anisotropy.** Tadayasu Mitui. *Physical Society of Japan, Journal,* v. 13, June 1958, p. 549-559.

The behavior of ferromagnetic precipitates in Cu-Co alloy containing 2% Co heat treated with magnetic field. The magnitude of magnetic anisotropy induced by magnetic annealing measured as functions of the aging temperature, aging time and intensity of magnetic field. 26 ref. (P16; Cu, Co)

385-P.* (French.) **Possible Effect of Air on Very Thin Films of Silver.** Jean Trompette. *Comptes Rendus,* v. 246, June 9, 1958, p. 3235-3238.

On basis of calculated indices of refraction and extinction of thin film and solid metal, optical constants of thin film of Ag deposited by thermal projection on strip of quartz were determined for film in vacuum and subsequently under atmospheric pressure. 4 ref.
(P17a, 2-66; Ag)

386-P.* (French.) **Thermomagnetic Study of the Allotropic Forms of Plutonium.** M. Seguin, M. M. Folmer, J. Friedel and E. Grison. *Comptes Rendus,* v. 246, June 9, 1958, p. 3243-3246.

Magnetic susceptibility of Pu determined over wide range of temperature by combining measurements taken during heating and cooling. No magnetic anomaly was noted; none of the allotropic forms appear to present paramagnetism of Curie-Weiss type. 7 ref. (P16; Pu)

387-P.* **The Fluidity of Some Aluminum Alloys.** S. Floreen and D. V. Ragone. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 391-393.

The fluidity of Al-Cu (0.33% Cu) and Al-Mg alloys (0.33% Mg) was measured using glass tubes as the fluidity channel. The fluidity of the alloys both at the liquidus and above varies inversely with the solidification range. 6 ref. (P10f; Al-b, Cu, Mg)

388-P.* **Magnetic Properties of Type 400 Series, 17-4 PH, and AM 355 Stainless Steels.** J. V. Alger. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 131-137.

The magnetic induction behavior of various types of stainless steels is utilized to design magnetic devices associated with reactor control rod drive mechanisms. (P16; SS-b)

389-P.* **Domain Observations on Iron Whiskers.** R. W. DeBlois and C. D. Graham. *Journal of Applied Physics,* v. 29, June 1958, p. 931-939.

Ferromagnetic domain walls have been observed by standard methods on iron whiskers. The whiskers are square in cross section, generally 20 to 60 microns on a side, and up to 1 cm. long. The whiskers are single crystals with the axis in a <100> direction and the faces nearly perfect {100} planes. The domain patterns are exceptionally clear and simple. Several characteristic patterns have been described and represented with three-dimensional models. 15 ref. (P16c; Fe, 14-61)

390-P. Relation Between Crystallite Orientation and Magnetic Properties of Elongated Single-Domain Iron Particles. E. F. Fullam and D. S. Hallgren. *Journal of Applied Physics,* v. 29, June 1958, p. 989-993.

Crystallographic orientation of the particles, determined by electron diffraction, is compared to the orientation inferred from the observed morphology and magnetic properties. 15 ref. (P16; M26c, Fe)

391-P.* **Polarization and Overpotential of Au-Cu Alloy in Aqueous Solutions.** I. A. Ammar and S. Riad. *Journal of Physical Chemistry,* v. 62, June 1958, p. 660-664.

Cathodic and anodic polarization measurements have been carried out on an alloy of Au and Cu in aqueous solutions. Attempts have been made to explain the results obtained and these have been compared with the results on pure Au and Cu. (P15; Al-b, Cu-b)

392-P.* **Volume Change of Indium Antimonide During Fusion.** Norman H. Nachtrieb and Noriko Clement. *Journal of Physical Chemistry,* v. 62, June 1958, p. 747-750.

The change in volume of indium antimonide on fusion determined from measurements of the change in pressure of argon at constant volume. The average of six determinations gives $100\ \Delta V/V_s = 13.7 \pm 0.5\%$, referred to the solid. 9 ref. (P10d; In, Sb)

393-P. Study on Castability. Pt. 2. Kazuo Hori. *Kumamoto University, Faculty of Engineering, Memoirs,* v. 5, Dec. 1957, 2 p.

Viscosity and fluidity of molten metal. (P10f, E-general)

394-P. A Review of Heat Transfer Literature, 1957. E. R. G. Eckert, J. P. Hartnett and T. F. Irvine. *Mechanical Engineering,* v. 80, June 1958, p. 64-75.

Reviews conduction, channel flow, boundary layer flow, flow with separated regions, transfer mechanism, natural convection, transpiration cooling, change of phase, radiation, liquid metal, measurement techniques and heat transfer applications. 270 ref. (P11k)

395-P.* **Heat Capacity of Copper-Germanium Alloys Below 4.2° K.** John A. Rayne. *Physical Review,* v. 110, May 1, 1958, p. 606-611.

Heat capacity measurements below 4.2° K. on a series of alloys in the primary phase of the Cu-Ge system. When corrected for lattice expansion, the resulting change in the electronic specific heat for low electron/atom ratios is found to be the same as that for the Cu-Zn system. 20 ref. (P12r, 2-63; Cu, Ge)

396-P.* **Lattice Conductivity of Tin.** M. Garfinkel and P. Linden-

feld. *Physical Review,* v. 110, p. 883-887.

Thermal conductivities of several impure Sn specimens measured at liquid helium temperatures. Impurities of antimony, bismuth and indium between 0.1 and 6% were used to lower the electronic conductivity. Investigation was aimed at obtaining a measure of the lattice contribution to the thermal conductivity of Sn. 13 ref.
(P12h, 2-63; Sn, *Bi, In, Sb*)

397-P. The Variation With Temperature of the Magnetic Leakage Field in Cobalt. M. Blackman and E. Grunbaum. *Royal Society Proceedings,* v. 245, June 24, 1958, p. 408-416.

The variation with temperature of the magnetic leakage field of an unmagnetized crystal of hexagonal Co investigated by means of an electron beam. It was found that the strength of the magnetic leakage field decreased steadily with increasing temperature. 12 ref. (P16; Co)

398-P. Surface States on Germanium. George Wallis. *Sylvania Technologist,* v. 11, Jan. 1958, p. 6-12.

The properties of slow and fast surface states on etched Ge; some methods of investigating the states. 25 ref. (P15; Ge)

399-P. Thermal Conductivity of Tellurium. G. B. Bagduev and M. A. Kazhlaev. *Soviet Physics, "Doklady",* v. 2, 1957, p. 556-558. (Translation by American Institute of Physics, Inc.)

Results of investigations of the temperature dependence of thermal conductivity λ in pure Te from 10° to 500°. The thermal conductivity was determined by the plane compensating method [3] in a vacuum which protected the specimens from oxidation at the melting point. 9 ref. (P11h; Te)

400-P. Vitreous Semiconductors. Some Properties of Materials in the As_2Se_3-As_2Te_3 System II. T. N. Vengel and B. T. Kolomiets. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 2314-2319. (Translation by American Institute of Physics, Inc.)

6 ref. (P15; As, Se, Te)

401-P. Superconductivity of Beryllium Films Condensed on a Cold Backing. B. G. Lazarev, A. I. Sudovtsev and A. P. Smirnov. *Soviet Physics JETP,* v. 6, Apr. 1958, p. 816-817. (Translation by Consultants Bureau, Inc.)

Thickness of the measured films was approximately 10^{-6} cm. The only stable films were those thinner than 10^{-5} cm.; further increase in thickness caused them to crack.
(P15g; Be)

402-P.* (French.) **An Approximation of the Free Enthalpy Diagram of the Ternary System Fe-Mn-Si at 1600° K.** Etienne Bennier. *Comptes Rendus,* May 5, 1958, p. 2617-2619.

Binary and ternary phase diagrams of the system Fe-Mn-Si were used as experimental basis for estimation of curves of activity of the constituents, using known phase relationships, certain "standard" features of solutions and the Gibbs-Duhem equation. 8 ref.
(P12r, M24c; Fe, Mn, Si)

403-P.* (French.) **Refractoriness of the Serpentine - Dolomite System.** A. Braniski. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 127-144.

A study of the variation of the refractoriness of 80 different serpentine and dolomite ceramic mixtures in which the percent dolomite increased from 0 to 100.
(P11; RM-h)

404-P.* (Spanish.) **Porosity in 85-5-5-5 Type Bronze Castings. Pt. 2. Effect of Thickness of Section, Pouring Temperature and Feeder System.** Sebastian F. Matas. *Revista de Ciencia Aplicada,* v. 12, May-June 1958, p. 238-244.

Parts with sections of graduated thickness revealed decrease in density of bronze as thickness of section increased. However, an irregular low density was noted for 3-mm. section poured at 1120° C. Increase in pouring temperature appeared to increase density of 3-mm. section. Density of 6-mm. sections varied little with different pouring temperatures. Porosity produced at low temperature pouring due to nonfilling of microcavities caused by contraction is of same order as that produced at higher temperatures by release of gases; 12 and 24-mm. sections showed decrease in density with increase in pouring temperature. In casting of hollow cylinders, no appreciable influence of feeder design was revealed by pressure tests under water; metallurgy of bath seems to be more important factor here. 5 ref.
(P10a, P10m, E-general; Cu-s)

405-P. Thermodynamic Properties of Solid Solutions. Pt. 1. Copper + Zinc Solid Solution. B. B. Argent

and D. W. Wakeman. *Faraday Society, Transactions,* v. 54, June 1958, p. 799-806.

Thermodynamic functions for Zn in Cu-rich solid solutions of the system Cu-Zn calculated from measurements of vapor pressure. 22 ref. (P12, M24b; Cu, Zn, 14-67)

406-P. The Thermodynamic Properties of Solid Solutions. Pt. 2. Copper-Rich Primary Solid Solutions of Copper + Zinc + Gallium and Copper + Zinc + Germanium. B. B. Argent and D. W. Wakeman. *Faraday Society, Transactions,* v. 54, June 1958, p. 807-813.

Thermodynamic functions for Zn in Cu-rich solid solutions of the systems Cu-Zn-Ga and Cu-Zn-Ge calculated from measurements of vapor pressure. Thermodynamic functions are discussed in terms of electronic and lattice distortion effects. 21 ref. (P12, M24b; Cu, Ga, Ge, Zn, 14-67)

407-P. The Heats of Formation in the System Aluminum + Nickel + Titanium. O. Kubaschewski. *Faraday Society, Transactions,* v. 54, June 1958, p. 814-820.

The heats of formation of 49 ternary and 27 binary alloys in the Ni-Ti-Al system determined from the component metals. 11 ref. (P12q, M24b; Al, Ni, Ti)

408-P. Enthalpy of Formation of Lithium and Barium Bismuthides. S. A. Shchukarev, M. P. Morozova, Kan Kho Yn and V. T. Sharov. *Journal of General Chemistry of the USSR,* v. 27, 1957, p. 321-323.

11 ref. (P12r, M24b; Li, Ba, Bi)

409-P. The Enthalpy of Formation of Lithium, Magnesium and Zinc Arsenides. S. M. Ariya, M. P. Morozova, Khuan Tszi-tao and E. Volf. *Journal of General Chemistry of the USSR,* v. 27, 1957, p. 325-327.

7 ref.

(P12r, N24b; As, Li, Mg, Zn)

410-P. Thermo-Electricity at Low Temperatures. Pt. 6. A Redetermination of the Absolute Scale of Thermo-Electric Power of Lead. J. W. Christian, J. P. Jan, W. B. Pearson and I. M. Templeton. *Royal Society Proceedings,* v. 245, June 3, 1958, p. 213-221.

(P15p, 2-63; Pb)

411-P. (German.) **Mechanism of Conductivity in the System Cu-Te.** Günther Harbetke. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 9, 1957, p. 180-188.

Measurements of electrical conductivity, Hall effect and infrared absorption of compact samples and evaporated layers of Cu_2Te. 17 ref. (P15g, P15p, P17c; Cu, Te)

412-P. (German.) **Temperature Dependence of the Photo-Electric Effect of Sb-Cs Photo Cathodes in the Temperature Range −170 to +20° C.** Zs. Naray. *Annalen der Physik,* v. 20, Nov. 30, 1957, p. 386-389.

5 ref. (P15p, 2-61; Cs, Sb)

413-P. (German.) **Measurements of Conductivity in Zinc Powder Coatings.** H. Ladeburg and H. Ammer. *Deutsche Farbenzeitschrift,* May 1958, p. 181-186.

(P15g; Zn, 8-70)

414-P.* (German.) **Present State of Development and Production of Transformer Sheet (3% Si).** Günther Rassmann. *Neue Hütte,* v. 3, Apr. 1958, p. 193-203.

Magnetic and electrical properties of hot and cold rolled transformer sheets—watt losses, minimum induction, coercive force and hysteresis losses. Magnetic properties can be greatly improved through higher temperatures during final annealing. Texture of cold rolled steel is important and depends on the carbon and nitrogen contents. 11 ref. (P15, P16; ST, *Si,* SGA-n)

415-P.* (German.) **Viscosity Observations in the System CaO-SiO_2-Al_2O_3 and Their Applicability on Slags Obtained From Direct Reduction.** Johann Schleier. *Neue Hütte,* v. 3, May 1958, p. 282-293.

Slags in the direct reduction process present a problem during beneficiation of lower grade iron ore. Extensive experiments and tests were carried out to determine the influencing factors on slag formation. Viscosimeter was developed by the use of the principle of rotating cylinders permitting absolute viscosity measurements in the range of 10 to 100,000, Poise. Synthetic slags were tested and viscosity diagrams for 1300, 1400 and 1500° C. were developed. 47 ref. (P10f, D11n; RM-b)

416-P. (German.) **Modification of Physical Properties of Ferromagnetic Materials in Magnetic Fields.** H. Jahn. *Technik,* Jan. 1958, p. 29-35.

Influence of fields of force on ferromagnetic materials. (P16e, 2-67)

417-P. (German.) **Method of Determination of Heat Conductivity of Thin**

Specimens at High Temperature. Franz Ph. Pott. *Zeitschrift für Naturforschung,* v. 13a, Feb. 1958, p. 116-125.

8 ref. (P11h)

418-P. (German.) **Magnetic Properties and Electron-Microscope Structure of Electrolytically Deposited Thin Layers of Nickel-Iron Alloys.** Ludwig Reimer. *Zeitschrift für Physik,* v. 150, Dec. 21, 1957, p. 99-105.

10 ref. (P16, M21e; Ni, Fe)

419-P. (German.) **Measuring Hall Effect in Ferromagnetic Nickel Layers.** Ludwig Reimer. *Zeitschrift für Physik,* v. 150, Feb. 14, 1958, p. 277-286.

22 ref. (P15p, P16; Ni)

420-P. (German.) **Electron Emission Observation of Metal Surfaces.** W. Bayh. *Zeitschrift für Physik,* v. 151, May 1958, p. 282-295.

17 ref. (P15k)

421-P. (German.) **Magnetic Tests With Chromium and Chromium Solid Solutions.** Rudolf Lingelbach. *Zeitschrift für Physikalische Chemie,* v. 14, Jan. 1958, p. 2-31.

(P16; Cr, 14-67)

422-P. (Italian.) **Introduction to the Theory of Electrical Conduction in Semiconductors.** G. Bonfiglioli. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 126-130, 148.

Electrical conduction theories of Drude and Lorentz and of Sommerfeld, most recent band theory of solids for explaining electrical conduction and the phenomenon of semiconductivity. Shockley's conception of conduction by electrons and holes. Effect of impurities in semiconductors. (P15g, 3-69; EG-j)

423-P. (Italian.) **Electronics of Semiconductors and Their Applications.** M. G. de Plabachelerie. *Metallurgia Italiana,* v. 50, Apr. 1958, p. 131-135.

The structural properties of semiconductors, with Ge taken as a reference, and the conditions under which intrinsic and extrinsic conductivity by electrons and holes is obtained. Nature of n-type and p-type semiconductors. List of rectifiers, transistors, and other devices based on semiconductors now on the market. (P15g, M27, T1k; Ge, EG-j)

424-P. (Japanese.) **Magnetic Properties and Microstructure of the Permanent Magnet Alloy Alcomax.** Kyoji Tachikawa. *Institute of Science and Technology in Tokyo University, Report,* v. 12, no. 1, 1958, p. 1-8.

Influence of heat treatment on magnetic properties and microstructure of the high-coercive-force alloy Alcomax as well as Alnico 5. (P16, M27; SGA-n)

425-P. Nuclear Magnetic Resonance in Indium Antimonide. Pt. 1. The Effect of Impurities. E. H. Rhoderick. *Philosophical Magazine,* v. 3, June 1958, p. 545-563.

32 ref. (P16f, 3-69; In, Sb)

426-P. Nuclear Magnetic Resonance in Impure Indium Antimonide. M. H. Cohen. *Philosophical Magazine,* v. 3, June 1958, p. 564-566.

4 ref. (P16f; In, Sb)

427-P. Thermo-Electric Properties of Lead Telluride. E. Z. Gershtein, T. S. Stavitskaia and L. S. Still'bans. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 2302-2313. (Translation by American Institute of Physics, Inc.)

21 ref. (P15; Pb, Te)

428-P. The Surface Tensions of Ternary Hg-Cd-K Metallic Solutions at 22° C. P. P. Pugachevich and V. B. Lazarev. *Academy of Sciences of the USSR, Proceedings,* v. 113, 1957, p. 157-159. (Translation by Consultants Bureau, Inc.)

13 ref. (P13h; Ag, Cd, K)

429-P. The Influence of Technological Factors on the Electromagnetic Properties of Cold Rolled Transformer Steel. M. M. Ioffee, A. G. Petrenko and G. F. Chub. *Stal',* v. 17, Oct. 1957, p. 936-940. (Iron and Steel Institute Translation no. 897.)

Previously abstracted from original. See item 98-P, 1958.
(P16, 2-60, 1-73; ST, SGA-n)

430-P. (English.) **The Thermoelectric, Galvanomagnetic and Thermomagnetic Effects of Monovalent Metals.** Mikio Tsuji. *Physical Society of Japan, Journal,* v. 13, Feb. 1958, p. 133-148.

35 ref. (P15, P16)

431-P. (German.) **Determination of Thermodynamic Activity Using Vapor Pressure Comparative Method Illustrated on Liquid Gallium-Cadmium Alloys.** Bruno Predel. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 226-231.

(P12b, P12c; Cd, Ga, 14-60)

432-P. (Slovenian.) **Application of Thermodynamics in Metallurgy. Pt. 2.** A. Podgornik. *Rudarsko-Metalurški Zbornik* no. 1, 1958, p. 27-41.

Methods of quantitative thermal analysis applied in industry for the

investigation of metal systems. (P12)

433-P.* Concerning the Change of the Electrochemical Activity of Zirconium Under the Action of Radiation. I. L. Rozenfeld and E. K. Oshe. *Proceedings of the Academy of Sciences of the USSR, Physical Chemistry Section,* v. 114, p. 277-280.

By irradiating the elements Zr-Al and Zr-Fe in a flowing electrolyte (3% NaCl) with a stream of high-energy electrons at an intensity of 15 microampere per cm^2 a sharp increase in the current of the couples was observed. (P15g; Zr, 2-67)

434-P.* Thermal Expansion of Lead at Low Temperatures. P. N. Dheer and S. L. Surange. *Philosophical Magazine,* v. 3, July 1958, p. 665-674.

Changes in length of lead rod due to thermal expansion measured between 4.2 and 10° K. by a heterodyne-beat method in which the changes modify the capacity of a condenser in a resonant circuit. 9 ref. (P11g; Pb, 2-63)

435-P.* Effects of Heat and Pressure on the Swelling of Irradiated Uranium. A. T. Churchman, R. S. Barnes and A. H. Cottrell. *United Kingdom Atomic Energy Authority, AERE M/R 2510,* 1958, p. 1-14.

Small pieces of a natural uranium fuel bar, after irradiation at below 300° C., were heated to higher temperatures under various pressures. Conclusion is drawn that swelling is caused by the separation of the fission gases, krypton and xenon, to form gas pockets in the metal. Mechanism of swelling. 13 ref. (P11g, U; 2-62, 3-74)

436-P. Magnetic Properties of the Gd-La and Gd-Y Alloys. W. C. Thoburn, S. Legvold and F. H. Spedding. *Physical Review,* v. 110, June 15, 1958, p. 1298-1301.

(P16; Gd, La, Y)

437-P. Heat Conduction in Bismuth Telluride. H. J. Goldsmid. *Physical Society Proceedings,* v. 72, July 1, 1958, p. 17-26.

14 ref. (P15g, Bi, Te)

438-P. (German.) **Mechanism of Wire Explosions.** E. Fünfer, M. Keilhacker and G. Lehnar. *Zeitschrift für Angewandte Physik,* v. 10, Apr. 1958, p. 158-162.

Copper and silver wires vaporized by electric discharge. Observation by oscillograph and by optical methods. Estimation of the temperature developed by wire explosion. 18 ref. (P15p, S16; Ag, Cu, 4-61)

439-P. (Book—German.) **Physical Properties of Metals.** Eckart Vogt. v. 1. 1958, 467 p. Akademische Verlagsgesellschaft, Geest & Portig, Leipzig, Germany. DM 59.

Metals from point-of-view of atomic physics; electron theory applied to metals; thermo-elastic behavior; diamagnetism, paramagnetism and primary ferromagnetic properties; secondary ferromagnetic properties. 742 ref. (P-general)

440-P. Investigation of Alloys of Magnesium and Their Properties. Pt. 2. Thermal and Electrical Properties of Magnesium-Base Alloys. H. Baker. Dow Chemical Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131436, Sept. 1957, 28 p. $.75.

Electrical resistivities to 500° F. were determined for the cast Mg alloys AZ31A and B, AZ36A, AZ81A, AZ91C, AZ92A, AM100A, EK30A EK41A, EZ33a HK31A, rolled HK31A and HM21XA, extruded HM31XA, cast HZ32A, EM31, EM31 (Zr grain refined), EK31 (with rare earth in the ratio 2 Di/1 MM), and EK31 (with rare earth as Di only). Thermal conductivities of cast AZ31A and B, AZ63A, AZ81A, AZ91C, AZ92A, AM100A, EK30A, EK41A, EZ33A, HK31A, rolled HK31A and HM21XA, and cast HZ32A were calculated from the electrical data. Values of enthalpy, specific heat, and heat of fusion measured for AZ31B, HK31A, HM21XA, HM31XA, and ZK60A.
(P15g, P11h, P12r; Mg-b)

441-P.* Note on the Specific Heat of Plutonium Metal. D. J. Dean, A. E. Kay and R. G. Loasby. *Institute of Metals, Journal,* v. 86, June 1958, p. 464.

Values for the specific heat of Pu over the range from −40 to 550° C. and for the latent heats of transformation at the various phase transitions. (P12r, P12q; Pu)

442-P.* An Evaluation of Interface Energies in Metallic Systems. J. W. Taylor. *Institute of Metals, Journal,* v. 86, June 1958, p. 456-463.

Method for calculating solid-solid and solid-liquid interface energies based on estimates of grain boundary energies of a number of pure metals and solid solutions. Grain-boundary energies are derived from

the corresponding liquid surface energies, coupled with the assumption that the surface energy of a solid metal or alloy may be estimated from that of the corresponding liquid by applying a correction of one-third of the latter for the increase of surface energy on freezing and that the grain boundary energy of a metal or alloy is taken as being one-third of the corresponding solid surface energy. 24 ref. (P13h)

443-P.* Nitrogen in Steel. Digest of six papers presented at the Electric Steel Conference, A.I.M.E., Pittsburgh, December 1957. *Metal Progress,* v. 74, July 1958, p. 136, 138, 140, 142.

Calculations showing the maximum solubility in nitrogen of typical N-Mn-Cr steels. Heats of the corresponding analyses were then made and chemical analysis closely checked the predictions.
(P12e, D5; SS, Mn, Cr)

444-P.* Optical Properties of Semiconductors Under Hydrostatic Pressure. Pt. 3. Germanium-Silicon Alloys. William Paul and D. M. Warschauer. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 6-15.

The optical absorption edge of a number of Ge-Si alloys was measured at room temperature as a function of hydrostatic pressure from 1 to 7000 kg. per sq. cm. The pressure variation of the energy corresponding to the edge $(dE/dP)_T$ varies continuously with composition from pure Ge to pure Si. A break in this curve is found between 10 and 20% Si, consistent with an interpretation in which the (100) conduction-band minimum becomes lower than the (111) minimum as Si content is increased. 11 ref. (P17a, 3-74; Ge, Si)

445-P.* Constitution and Magnetic Properties of Iron-Rich Iron-Aluminum Alloys. A. Taylor and R. M. Jones. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 16-37.

Constitution of high-purity Fe-Al alloys over the composition range 0-62 at.% Al investigated, primarily by X-ray diffraction methods. New lattice-parameter data were obtained. Diffraction patterns taken at elevated temperatures show that the phase diagram needs correction in the region of Fe_3Al, along with the further addition of a sloping transformation boundary beyond 18% Al. Alloys in the composition range 18-33% Al undergo a classical phase change and, on heating, pass successively from the Fe_3Al type of atomic ordering to the FeAl type. 49 ref. (P16, M24b, N6; Fe, Al)

446-P.* Magnetic Structure of Fe_3Al. R. Nathans, M. T. Pigott and C. G. Shull. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 38-42.

A polarized-neutron-beam spectrometer was used to determine the room-temperature magnetic structure of ordered Fe_3Al. Results show that the Al atoms possess no magnetic moment and that the Fe moments differ for the two sublattice sites. Data taken on higher-order magnetic reflections also permitted a comparison of the magnetic form factors for each of the different sites with that of metallic iron. 7 ref. (P16; Fe, Al)

447-P.* Resistivity and Hall Coefficient of Antimony-Doped Germanium at Low Temperatures. H. Fritzsche. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 69-80.

The Hall coefficient R and resistivity p of Ge single crystals containing between 5×10^{14} and 10^{18} antimony atoms per cc. were reinvestigated at temperatures between 1·3 and 300° K. Two different processes of impurity conduction could be distinguished by adding compensating p-type impurities to n-type Ge and investigating the resulting change of p at low temperatures. 32 ref.
(P15, 2-63; Ge, *Sb*)

448-P.* Electrical Resistivity and Thermal Conductivity of Plutonium Metal. Thomas A. Sandenaw and Robert B. Gibney. *Physics and Chemistry of Solids, Journal,* v. 6, July 1958, p. 81-88.

The electrical resistivity of two specimens of high-purity Pu is reported for the temperature range from 26° K. to approximately 780° K. These resistivity measurements give further evidence for the six allotropic modifications of solid Pu found by thermal analysis and dilatometric measurements. Temperature coefficients of resistivity for the various phases are included, as well as indicated phase-transformation temperatures and the heat of transition for the alpha→beta change. 7 ref. (P15g, P11h, N6p; Pu)

449-P.* Electrical Resistivity of Thin Films of Potassium at 100° K. D. G. Worden and G. C. Danielson.

Physics and Chemistry of Solids, Journal, v. 6, July 1958, p. 89-95.

Measured as a function of thickness in the range 148-1600 Å. The experimental results are in excellent agreement with Fuch's theoretical predictions in the range 500-1600 Å and show that the scattering of the electrons at the film surfaces is completely diffuse. Comparison of experimental and theoretical curves gives a bulk resistivity parameter of 1.85 μΩ-cm., a mean free path of 1180 Å, and an electron to atomic density ratio of 1·0. 15 ref. (P15g, 2-63; K, 14-62)

450-P. Measurement of the Thermal Properties of Various Aircraft Structural Materials. P. C. Covington and S. Oglesby, Jr. Southern Research Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131432, Aug. 1957, 71 p. $2.

Thermal properties of a group of metal and plastic structural materials which included honeycomb cores, a foamed-core sandwich panel, a laminated panel and sandwich panels with various honeycomb cores and facing materials. (P12, T24a; 7-59)

451-P. Measurement of Convective Heat and Mass Transfer. A New Approach. R. A. Granville and A. Sigalla. *Iron and Steel,* v. 31, July 1958, p. 355-356.

Simple method of measuring local skin coefficient; relevance to heat and mass transfer phenomena; proposes application of technique to heat and mass transfer problems of iron and steel industry. (P11k, P11j)

452-P. The Water Wettability of Metal Surfaces. Donald J. Trevoy and Hollister Johnson, Jr. *Journal of Physical Chemistry,* v. 62, July 1958, p. 833-837.

Preparatory techniques and contact angles with water reported for seven metals and alloys: Al, brass, Cu, Mg, Ni, SS, and Zn. (P13h; Al, Cu-n, Cu, Mg, Ni, SS, Zn)

453-P. Anomalous Transmission of X-Rays by Single Crystal Germanium. L. P. Hunter. *Physical Sciences, Proceedings,* v. 61, 1958, p. 214-219.

6 ref. (P17c; Ge, 14-61)

454-P. A Semi-Empirical Equation for the Initial Susceptibility of Homogeneous Ferromagnetic Alloys. E. W. Lee and R. C. Jackson. *Physical Society, Proceedings,* v. 72, July 1, 1958, p. 130-134.

6 ref. (P16; SGA-n)

455-P. On the Effect of Magnetic Field Cooling on Permeability of 45-25 Perminvar and 65 Permalloy. Makoto Sugihara. *Science Reports of the Tohoko University,* v. 41, Jan. 1958, p. 221-225.

Initial permeability increased when a magnetic field was applied in the vicinity of 480° during cooling. 4 ref. (P16; Ni-b, SGA-n)

456-P. The Effect of Sulphur on the Solubility of Oxygen in Liquid Iron. Z. Buzhek and A. Samarin. *Academy of Sciences of the USSR, Proceedings,* v. 114, 1957, p. 437-438. (Translation by Consultants Bureau, Inc.)

5 ref. (P12e; Fe, *O, S*)

457-P. (Russian.) **Residual Magnetization of Nickel and Its Stability.** I. E. Startseva and Ya. S. Shur. *Fizika Metallov i Metallovedenie,* no. 3, 1956, p. 568.

Influence of the preliminary treatment (recrystallizing anneal, oxidizing anneal, and plastic deformation by tension or compression) on the value of I_r of Ni and its stability against alternating magnetic fields, mechanical vibrations and temperature fluctuations. (P16; Ni)

458-P. (Russian.) **Density and Surface Tension of Liquid Commercial Titanium.** V. P. Yelyutin and M. Maupakh. *Izvestiya Akademii Nauk S.S.S.R., Otdelenie Tekhnicheskikh Nauk,* no. 4, 1956, p. 129-131.

Method and results for Ti alloy with 0.1% Fe, less than 0.2% Si, less than 0.1% Ca, and less than 0.5% Mg. At the crystallization temperature the surface tension was equal to 1510 ±18 dyne per cm. (P13h; Ti)

459-P. (Russian.) **Temperature Dependence of Magnetic Susceptibility of Electrons in a Metal.** G. E. Zil'berman and F. I. Itskovich. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* no. 1, 1957, p. 158-160.

Calculated at limitingly weak magnetic fields over a wide temperature range for hexagonal crystals and Bi. The calculation was carried out for a quadratic dependence of the electron energy on the wave vector. Formulas for susceptibility were obtained for the cases where only small

groups of conductivity electrons exist in K-space; in addition to them, there is a larger electron group; and there is also a larger group of holes. It was found that certain metals have a comparatively simple temperature-dependence of magnetic susceptibility. (P16)

460-P. (Russian.) **Preparation and Study of Intermetallic Compounds in Thin Layers.** V. A. Presnov and V. F. Synorov. *Zhurnal Tekhnicheskoi Fiziki,* no. 1, 1957, p. 123-126.

The electrical properties of binary preparations of the systems Al-Sb, In-Sb and Ga-Sb, obtained by mutual evaporation on glass spoons, were studied in relation to the concentration of the components. The electrical properties of thin layers of AlSb, InSb and GaSb differ strongly from the properties of the bulky forms. Electrical conductivity changes little up to room temperature, but at higher temperatures it quickly decreases. In individual specimens an inversion of the sign of the Hall constant is explained by the advance of the natural conductivity at about 100° because of the small size of the forbidden zone. Alpha increases considerably with rise of temperature. (P15; Al, In, Ga, Sb, 14-62)

461-P. (Russian.) **Experimental Investigation of the Transverse Nernst-Ettinghauser Effect in Tellurium.** I. V. Mochan. *Zhurnal Tekhnicheskoi Fiziki,* no. 6, 1955, p. 1003-1012.

Dependence of the Nernst constant on temperature was experimentally plotted and a maximum at 350° K. was confirmed. Presence of a maximum is due to the occurrence of carriers of opposite sign. (P15g; Te)

462-P. (Russian.) **Electric Conductivity of Germanium-Silicon Alloys in Liquid State.** M. S. Ablova, O. D. Yelpat'yevskaya and A. R. Regel'. *Zhurnal Tekhnicheskoi Fiziki,* no. 6, 1956, p. 1366-1368.

Measured by method of rotating magnetic fields in vacuum at high temperatures. Dependence of the width of the forbidden zone, of the value of the jump in electric conductivity upon melting, and of the maximum electric conductivity in the liquid state on the percentage ratio of the alloy component. (P15g; Ge, Si, 14-60)

463-P. (Russian.) **Heat Conduction of Commercial Materials at Low Temperatures.** N. V. Zavaritskiy and A. G. Zel'dovich. *Zhurnal Tekhnicheskoi Fiziki,* no. 9, 1956, p. 2032-2036.

Thermal conductivity in the range from 2 to 100° K. was measured for copper (annealed and unannealed), Cupalloy (unannealed), Duralimin (unannealed), phosphor bronze (unannealed), "mel'khior" (Cu-Ni alloy)-(annealed and unannealed), manganin (unannealed), stainless steel (unannealed), and graphite. The average heat conduction of these materials was calculated in the ranges from 4.2 to 20.4, 20.4 to 78, and 4.2 to 78°. (P11h; Cu, Cu-b, Cu-s, Ni, SS)

464-P. On the Coercive Force and the Width of the X-Ray Interference Line in Low-Carbon Alloyed Steels. Ya. M. Golovchiner and V. M. Golubkov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 151-154. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Parallel studies of hardness, coercive force and widths of X-ray interference lines after hardening and tempering. The presence of rather difficulty soluble carbides in the steels studied necessitated hardening from 1320-1330° C. Concluded that in the temperature range under investigation the steel remains homogeneous and there is no decrease in the lattice distortion. 4 ref. (P16, Q29n, 2-64; ST)

465-P. Solubility Limit of Certain Alloying Admixtures in Steel. N. S. Fastov and B. N. Finkelshtein. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 200-204. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

The effect of any alloying admixture on the properties of the steel depends substantially on whether it is in the basic solid solution or in the insoluble carbide. Thus it is of great interest to determine the solubility limit of the alloying admixture in the austenite, and also the amounts and the compositions of the carbide phase as functions of the composition of the steel and of its heat treatment. A steel alloyed with vanadium was considered. Two phases of the steel were formed after isothermal soaking, in equilibrium with each other: austenite, alloyed with vanadium and carbide of vanadium. (P12e, N8, ST)

466-P. Thermodynamic Activity of Carbon in Austenite Containing Man-

ganese and Silicon. V. M. Rozenberg and L. A. Shvartsman. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 211-218. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

An equation is proposed for the activity coefficient of carbon in austenite containing Mn and Si which can be used for approximate calculation of the solubility of carbon in austenite at various concentrations of the above elements for a temperature of 1000° C. Estimates were made of the values of heat of solution of carbon in Mn-containing austenite at various concentrations of Mn. 5 ref.
(P12b, P12q; ST, *C, Mn, Si*)

467-P. Properties of Ternary Alloys of the Diborides of Titanium, Chromium and Zirconium. K. I. Portnoi and G. V. Samsonov. *Doklady Akademii Nauk SSSR*, v. 116, no. 6, 1957, p. 976-978. (Henry Brutcher, Altadena, Calif., Translation no. 4273.)

Variation of microhardness, lattice constant and electrical resistivity of an equimolar mixture of Ti and Cr diborides when Zr diboride is alloyed with it. Solubility of ZrB_2 in the binary boride and of the binary boride of ZrB_2.
(P15g, M26, Q29n; Cr, Ti, Zr, B)

468-P. (Czech.) **Magnetization Curves of Thin Layers of Iron.** Karel Zaveta. *Ceskoslovenska Casopis Fiziki*, no. 3, 1956, p. 303-312.

Magnetization curves of layers measuring from 125 to 7870 Å obtained by evaporation in vacuum. A torsion magnetometer was used. The curves showing the magnetization work and the corresponding residual magnetization versus the thickness display an anomoly in the 1100 Å thickness range. It was shown by weighing that the density of the layer is less than the density of the metal. (P16; Fe, 14-62)

469-P. (Czech.) **Structure of Domains in Polycrystalline Materials. Pt. 2. Domains on Planes Making a Small Angle With (110).** Ladislav Spacek. *Ceskoslovenska Casopis Fiziki*, no. 3, 1956, p. 313-323.

Magnetic structure of polycrystalline iron with particular attention to the (110) surface. which is rotated somewhat relative to the [110] axis and the grinding plane. Domain structure is observed in individual crystals as a function of angle of inclination. Preparation of specimens, effect of mechanical and electrolytic polishing on domain structure, and action of anisotropic etching. Connection between domain structure and crystallographic orientation. (P16c; Fe)

470-P. (Russian.) **Hydrogen Adsorption of Nickel Layers Condensed in Deep Vacuum.** N. N. Kavtaradze. *Doklady Akademii Nauk SSSR*, no. 4, 1957, p. 822-825.

The adsorption of H_2 on Ni layers prepared by sublimation in vacuum was studied at temperatures from 195 to 100° and under pressures from 10^{-6} to 4×10^{-2} mm. of Hg. Shown that H_2 adsorption on Ni, Fe, Cr and Pt consists of a reversible and an irreversible part. The reversible part strongly depends on the pressure and the temperature; the irreversible part strongly depends basically on the temperature.
(P13d; Ni)

471-P. (Russian.) **Optical Properties of Polycrystalline Layers of Cadmium Selenide.** Vishchakas Brazdzhunas. *Lietuvos TSR Mokslu Akademija Darbai, Sbornik an Lit S.S.S.R.*, 1956, p. 21-33.

Investigation of the absorption, reflection and refraction of thin polycrystalline layers of cadmium selenide in the spectral region from 0.23 to 1.34 microns. The thickness of the layers varied from 0.1 to 3 microns. The absorption constant was determined with allowance for the reflection. On the edge of the band of intrinsic absorption, at 0.7 micron, there was observed a slight maximum of absorption, whose position corresponds to the position of the maximum of the photosensitivity of the layers. (P17; 14-62, Cd)

472-P. (Russian.) **Electroconductivity and Thermo-EMF of Intermetallic Compound SbZn.** M. V. Kot. *Ucheni Zapiski Khurkovsky Universitet*, no. 24, 1956, p. 11-18.

Electroconductivity and thermo-emf. of alloys of Zn and Sb containing 48 to 65 at. % Zn were measured in the range of 250 to 625° K. The width of the forbidden zone of the compound ZnSb was 0.6 ev. (P15g; Zn, Sb)

473-P. (Russian.) **The Curie Point in Thin Films of Ferromagnetics.** A. S.

Mil'ner and N. L. Polyakova. *Ucheni Zapiski Kharkovsky Universitet,* no. 64, 1956, p. 159-165.

Experimental verification of the dependence of the Curie point on the thickness of Ni films. Films are obtained by evaporation in vacuum on glass from a Ni wire or from a crucible made of Al oxide. Curie point was measured from the relative change in the magnetic moment of the film upon increase in temperature. The Curie temperature is independent whether the Ni is coated on cold or hot glass. The irreversibility of the first magnetization curve, its dependence on the speed of heating, and the increase in the magnetic moment at room temperature for Ni films coated on cold glass leads to the conclusion that apparently these films are in an unstable phase. (P16d; Ni, 14-62)

474-P.* On the Electrical Properties of Polycrystalline Boron. Ryosei Uno. *Physical Society of Japan, Journal,* v. 13, July 1958, p. 667-675.

Specimens of boron with various conductivities were studied. Conductivity varies not with impurity content, but with crystal structure. 18 ref. (P15g, 3-71; B)

475-P. (Russian.) **Ratio of Hysteresis to Eddy-Current Losses in Electric Steel.** V. V. Druzhinin and Yu. P. Burdakova. *Electrichestvo,* no. 8, 1956, p. 50-54.

Electromagnetic losses due to hysteresis and eddy-currents as a function of magnetization frequency and amplitude of a.c. induction. Reduction in the total electromagnetic loss, attained in recent years in the better grades of transformer steel, is due to a very sharp reduction in the hysteresis losses. (P16; ST, SGA-n)

476-P. (Russian.) **Investigation of the Change in the Electric Resistivity of Molybdenum Permalloy Under the Influence of Magnetization and Elastic Deformation.** R. G. Anniyev and G. Myalikgulyyev. *Izvestiya Akademii Nauk Turkmenskoi S.S.S.R.,* no. 2, 1956, p. 45-53.

Experimental investigation of longitudinal galvanomagnetic effect in Mo Permalloy (81.09% Ni, 14.9% Fe, 3.2% Mo and 0.81% other admixtures) in the inversion field. Measurements were carried out at room temperature. Curves show dependence of the longitudinal galvanomagnetic effect versus effective magnetic field and elastic force and versus the square of the intensity for both series of specimens. With simultaneous increase of magnetization and of elastic deformation, the value of the magnetization increases, while its electric resistivity decreases. (P15g, P16, 3-68; Ni-b, *Mo*)

477-P. (Russian.) **Determination of the Optical Constants of Germanium.** K. D. Sinel'nikov, I. N. Shklyarerskiy and B. S. Skorobogatov. *Ucheni Zapiski Kharkovsky Universitet,* no. 6, 1955, p. 135-140.

Index of refraction of thin Ge films was measured by the Ge-wedge method, coated in vacuum on glass or on silver. (P17b; 14-62; Ge)

478-P.* (Spanish.) **Thermogravimetric Study of Intermediate Products of Uranium Metallurgy.** L. Gasco and R. Fernandez. *Real Sociedad Espanola de Fisica y Quimica, Anales,* v. 54 (B), Mar. 1958, p. 181-190.

Thermal decomposition of some intermediate compounds such as uranium peroxide, ammonium uranate, uranium and ammonium pentafluoride, uranium tetrafluoride and uranous oxide studied by means of Chevenard's thermobalance. Some data on pyrolysis of synthetic mixtures of intermediate compounds which may occasionally appear during industrial processes. 20 ref. (P12, C-general; U)

479-P.* (English.) **Effect of Tension on the Magnetostriction of Iron Single Crystals.** Hideo Takaki and Jun-ichi Hayashi. *Physical Society of Japan, Journal,* v. 13, July 1958, p. 703-709.

Measured at room temperature by means of strain gage technique. 6 ref. (P16, 3-66; Fe, 14-61)

480-P.* (Russian.) **Influence of Annealing Conditions on Thermal Magnetic Aging of Permanent Magnets.** A. M. Morozova and F. I. Feigina. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 428-433.

Thermal magnetic aging with the aim of increasing magnetic stability. Lengthening of annealing time at 580° C., as well as annealing by stages under special conditions, will increase stability of permanent magnets without changing their coercive force. (P16, X11g, 2-64)

481-P. On Dispersability of Ferromagnetic Separations in Austenitic Alloys, Using Demagnetization Curves. N. I. Eremin. *Metallovedenie i*

Obrabotka Metallov, July 1958, p. 27-30. (Henry Brutcher, Altadena, Calif., Translation no. 4279.)

Domain boundaries do not form in ferromagnetic powder particles possessing strong coercive force. Because of removal of domain boundaries, the usual demagnetization mechanism cannot take place. Changes in magnetization can only take place because of the coherent spins rotating in the strong fields. Study of single domain separations in austenitic steels, within which can be found separations of ferrite, opens up a new field in physical metallurgy. (P16; ST, 6-68)

482-P. (Russian.) **The Nernst Thermomagnetic Effect in Iron-Nickel Alloys.** E. P. Svirina and R. P. Ivanova. *Frizika Metallov i Metallovedeniya*, no. 3, 1956, p. 444-468.

The relationship between the Nernst effect (N) and magnetization was studied on seven specimens of Fe-Ni alloys containing 28-85% Ni. Measurements were carried out in a solenoid producing a field of up to 1250 oersteds and magnetization was determined by the ballistic method. The Nernst e.m.f. was linearly dependent on magnetization, but a break was observed in the curves near saturation. Relationship between Nernst e.m.f. and alloy composition; effect on this relationship of heat treatment for the alloy $FeNi_3$ is tentatively explained by the ordering phenomena in this alloy. (P15g, P16; Fe, Ni)

483-P. (Russian.) **The Nernst-Ettingshausen Effect in Strong Magnetic Fields.** I. M. Tsidil'kovskii. *Zhurnal Tekhnicheskoi Fiziki*, no. 1, 1957, p. 12-22.

Measurements were made on seven specimens of HgSe, made by hot pressing or sawed from cooled melts. The longitudinal, transverse and longitudinal-transverse Nernst-Ettingshausen effects were measured in the range 130-480° K. at field strengths up to 10^4 oersted. Relationship between the Nernst-Ettingshausen effect field and the magnetic field at high field strengths is nonlinear, and shows a maximum, at which it is particularly useful to calculate the carrier mobility. (P15g, P16; Hg, Se)

484-P. (Russian.) **The Equilibrium and Nonequilibrium Properties of Polycrystalline Selenium.** P. T. Kozyrev. *Zhurnal Tekhnicheskoi Fiziki*, no. 1, 1957, p. 35-44.

Equilibrium electrical properties of polycrystalline Se, crystallized at atmospheric pressure and also at high pressure, from amorphous Se. Crystallized Se was brought to equilibrium condition by holding at 100-120° C. for 80-100 hr. and then at 40° C. for 100 hr. Observations were made of the reproducibility of the temperature-equilibrium electrical conductivity curve. With increasing temperature the equilibrium electrical conductivity increases to a certain maximum value and then decreases. (P15g, 2-61; Se)

485-P. (Russian.) **Electrical Properties of the Intermetallic Compound CdSb.** I. M. Pilat. *Zhurnal Tekhnicheskoi Fiziki*, no. 1, 1957, p. 119-122.

The Cd and Sb, after multiple vacuum distillation, had impurity contents $\leq 0.0001\%$. CdSb single crystals were made by fusion, followed by special heat treatment and zone melting. Activation energy is given. It was found possible to obtain high amplification factors, using suitable surface treatments, impurity additions and conditions of compound formation. (P15, Cd, Sb, 14-61)

486-P. (Russian.) **Galvano-Magnetic Properties of Tellurium at Low Temperatures.** S. S. Shalyt. *Zhurnal Tekhnicheskoi Fiziki*, no. 1, 1957, p. 189-204.

Studies of variation with temperature of the electrical conductivity of Te between 100° C. and 1.3° K., of the Hall constant and the change in resistivity in magnetic fields up to 26,000 oersteds at room temperature and at liquid N_2 and He temperatures. Attempts at theoretical interpretation of the experimental data. (P15g, P16, 2-63; Te)

487-P. (Russian.) **Excitation of Atoms of Semiconductors in Multi-Electronic Models.** S. V. Vonsovskii and A. N. Kushnirenko. *Fizika Metallov i Metallovedenie*, v. 5 no. 5, 1957, p. 395-401.

11 ref. (P15g; EG-j)

488-P. (Russian.) **Magnetic Properties of Magneto-Anisotropic Specimens of Ferromagnetic Powder.** E. V. Shtol'ts, Ya. S. Shur and G. S. Kandavrova. *Fizika Metallov i Metallovedenie*, v. 5, no. 5, 1957, p. 412-420.

7 ref. (P16; 6-68)

489-P. Enthalpy and Heat Capacity From 0° to 900° C. of Three Nickel-Chromium-Iron Alloys of Different Carbon Contents. Thomas B. Douglas and Ann W. Harman. *National Bureau of Standards, Journal of Research,* v. 60, June 1958, p. 563-568.

The enthalpy relative to 0° C. of three alloys measured at nine temperatures from 100 to 900° C. by a precise "drop" method. Results are almost independent of the several variations in prior heat treatment investigated and the heat capacity temperature curves of the three alloys are almost coincident, but there is a marked shift in each curve within the interval 500 to 600° C. 7 ref. (P12r; Ni, Cr, Fe)

490-P. (Russian.) Investigation of the Temperature Dependence of Heat Conduction, Electric Conductivity, and Specific Heat of Bi and Pb in a System of Bi-Pb Alloys. V. Ye. Mikryukov and N. A. Tyapunina. *Fizika Metallov i Metallovedeniye,* no. 1, 1956, p. 31-41.

Heat conduction and electric conductivity measured by the Kohlrausch method. Alloys of 22 different concentrations were investigated at temperatures to 242° C. (P11h, P15g, P12r, 2-61; Bi, Pb)

491-P. (Russian.) Study of Magnetization Processes in Silicon Iron by the Powder Figure Method. V. R. Abel's. *Fizika Metallov i Metallovedeniye,* no. 3, 1956, p. 562-563.

Magnetization process studied in Si-Fe (4% Si) crystals with various surface crystallographic orientations, in differently oriented magnetizing fields and for various specimen tnicknesses (0.005-0.3 mm.). Using the powder figure method the magnetic structure of the crystals and its changes under the influence of the magnetic field were studied. (P16; Fe, *Si,* SGA-n)

492-P. (Russian.) Investigation of the Change in the Electric Resistivity of Molybdenum Permalloy Under the Influence of Magnetization and Elastic Deformation. R. G. Anniyev and G. Myalikgulyyev. *Izvestiya Akademii Nauk Turkmenskoi SSR,* no. 2, 1956, p. 45-53.

Investigation of the longitudinal galvano-magnetic effect in Mo permalloy (81.09% Ni, 14.9% Fe, 3.2% Mo and 0.81% other admixtures) in the inversion field.
(P15g, P16; Ni, *Mo,* SGA-n)

493-P. (Russian.) Electroconductivity and Thermo-EMF of Intermetallic Compound SbZn. M. V. Kot. *Uchenye Zapiski Kishinevsk, Universiteta,* no. 24, 1956, p. 11-18.

Measured for alloys of Zn and Sb containing 48 to 65 at. % Zn in the range 250 to 625° K. Width of the forbidden zone of the compound ZnSb was 0.6 ev.
(P15, 2-63; Sb, Zn)

494-P. (Russian.) Temperature Dependence of Magnetostriction of Ferromagnetic Alloys. D. I. Volkov, V. I. Chechernikov and V. B. Tseytlin. *Vestnik Moskovskogo Universiteta,* no. 2, 1956, p. 21-28.

Study of alloys with a Ni-base (Ni-Cu, Ni-Co, Ni-Mn and a Ni-Fe alloy with 45% Ni) in the temperature region close to the Curie point. (P16b, 2-61; Ni-b)

495-P.* The Effects of Irradiation on Magnetic Materials. D. I. Gordon, R. S. Sery and R. E. Fischell. *Engineers' Digest,* v. 19, July 1958, p. 303-304, 318. (From *Nucleonics,* v. 16, June 1958, p. 73-77.)

A 3.5% silicon iron, Orthonol, two molybdenum Permalloys, vanadium Permendur, 16 Alfenol and nickel-ferrite studied. 6 ref.
(P16; 2-67, Fe, Al, Mo, Ni, Si, SGA-n)

496-P. (Russian.) Thermo-Electric Properties of the Compound $CrSb_2$. N. Kh. Abrikosov and V. F. Bankina. *Doklady Akademii Nauk SSSR,* no. 4, 1956, p. 627-628.

Electric conductivity and thermal emf. of Cr-Sb alloys (Sb 80 to 85%) and temperature dependence of these values for the compound $CrSb_2$ (82% Sb). The alloy with 82% Sb has a single-phase structure and had minimum electric resistivity and a maximum thermal emf. $CrSb_2$ is a chemical compound of the semiconductor type with activation energy of 0.16 and 0.32 ev.
(P15, 2-61; Cr, Sb)

497-P. (Russian.) Change in Thermal Emf. of Metals During Plastic Deformation. N. F. Kunin. *Fizika Metallov i Metallovedeniye,* v. 2, no. 2, 1956, p. 237-243.

The value of the absolute thermal emf. and of the Thomson coefficient are sensitive to a change in the properties of the metal (copper) during plastic deformation. Induced

thermal emf. increases with deformation, and its sign and magnitude are independent of the boundary conditions of the deformation.
(P15, 2-61, 3-68; Cu)

498-P. (Russian.) **Anomaly of Electric Resistance in the Fe_3Si Alloy.** I. G. Gutovskiy and Ya. P. Selisskiy. *Fizika Metallov i Metallovedeniye,* v. 2, no. 2, 1956, p. 375-376.

Electric resistivity of Fe_3Si at high temperatures; temperature region of disordering. Measurements show a strictly linear course of the resistivity vs. temperature curve up to 600°, where a sharp break in the curve was observed and a subsequent slight reduction in the electric resistivity as the temperature was increased to 1100° C.
(P15g, 2-61; Fe, Si)

499-P. (Russian.) **Measurement of Thermal Emf. of Metals of the Copper Subgroup Under the Influence of Plastic Deformation at Various Temperatures.** N. F. Kunin and I. Z. Melamed. *Fizika Metallov i Metallovedeniye,* v. 2, no. 3, 1956, p. 423-427.

For Cu, Ag and Au under 40-50% deformation at various temperatures, the induced thermal emf. is proportional to the magnitude of the relative deformation. Other conditions being equal, thermal emf. diminishes with increasing temperature.
(P15, 2-61, 3-68; Cu, Ag, Au)

500-P. (Russian.) **Electric Properties of Germanium at Super Low Temperatures.** E. I. Abaulina-Zavaritskaya. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* no. 6, 1956, p. 1158-1160.

Dependence of the electric resistivity of single crystals of Ge on temperature and on the intensity of electric field in the range from 0.15 to 20° K.
(P15, 2-63; Ge, 14-61)

501-P. (Russian.) **Electric Properties of the Intermetallic Compounds CdSb.** I. M. Pilat. *Zhurnal Tekhnicheskoi Fiziki,* no. 1, 1957, p. 119-122.

Electric conductivity and thermal emf. from −180 to +250° C., the rectification of CdSb at the point contact and the triode effect.
(P15, 2-61; Cd, Sb)

502-P. (Russian.) **Effect of Ion Bombardment on the Detecting Properties of Semiconductors.** V. E. Kaganer, A. R. Regel' and O. V. Sorokin. *Sbornik statey Leningradskogo Instituta Tochnoy Mekhanika i Optiki,* v. 18, 1955, p. 126-141.

Influence of ion bombardment on the voltage-current characteristics of a point contact Si, Ge, SiC, PbS and SbZn with tungsten. Ion bombardment carried out with ions of hydrogen, air, oxygen, benzine, tellurium and manganese to obtain p-n and p-n-p junctions on the surface of the crystals. (P15; EG-j)

503-P. (Russian.) **Effect of Chemical Composition on Magnetic Properties of Electrotechnical Iron.** N. N. Zaychikov, R. M. Zheltenkova, O. T. Kondratova, A. F. Korostylev, Yu. Ye. Korotkov, B. I. Mashirin, Yu. N. Mynkin and L. S. Panasyuk. *Trudy Moskovskogo Aviats. Instituta,* v. 60, 1956, p. 4-12.

Effect of grain size and chemical composition on the value of magnetizing force of Armco iron using chemical and metallographic data obtained in regular production shop tests. Correlation coefficient between value of magnetizing force and carbon content was found to be 0.301, and correlation between magnetizing force and the sulphur content was 0.372. Magnetizing force increases with increasing content of C or S. The content of Mn, P, Mi and Cu, does not exert a noticeable effect. The magnetizing force increases with diminishing grain size. (P16, 2-60, 2-59; Fe)

504-P. (Russian.) **Pressure Coefficient of Electric Resistivity of Certain Metals at the Temperature of Liquid Helium.** V. I. Khotkevich. *Uchenye Zapiski Khar'kovsk. Universiteta,* v. 64, 1955, p. 151-152.

Ag, Cu, Au, Pt and Pb were placed under pressure of 4000, 6900, 1800, 6900 and 1400 at. respectively. The first four were investigated at the temperature of liquid helium. Lead was investigated at the temperature of liquid hydrogen.
(P15g, 2-63, 3-74; Ag, Au, Cu, Pt, Pb)

505-P. (Russian.) **Technique for Measurement of the Relative Magnetic Viscosity of High-Coercivity Alloys.** B. V. Getling. *Zavodskaya Laboratoriya,* v. 23, no. 1, 1957, p. 42-48.

Apparatus consists of a ballistic galvanometer, a magnetizing device, a magnetic two-pole contactor with pushbutton stations, an electronic time relay of the relaxational type,

a magneto-electric oscillograph and a power pack. Magnetic viscosity of specimens was studied by following the time decay of residual inductance. Method was used for studying the magnetic viscosity of Fe-Ni-Al alloys with different Fe contents, and different heat treatments. (P16, X26; Fe, Ni, Al)

506-P. (Russian.) **Electric Properties of InSb.** D. N. Nasledov and A. Yu. Khalilov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 1, 1956, p. 6-14.

Investigation on monocrystalline and polycrystalline specimens of InSb of stoichiometric composition with excess of In or Sb (approximately 0.1%). Hall effect, change of resistance in the magnetic field and electric conductivity.
(P15; In, Sb)

507-P. (Russian.) **Thermo-Electric Properties of Cd-Sb Alloys.** V. A. Yurkov and N. Ye. Alekseyeva. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 4, 1956, p. 911-912.

A null method was used to measure the thermal emf. of Cd-Sb alloys relative to Cu for concentrations of 0-100% Sb at junction temperatures of 10 to 100° C.
(P15; Cd, Sb)

508-P. (Russian.) **Electrical Properties of Bismuth. Pt. 2. Electrical Properties of Bismuth Selenide. Pt. 3. Electrical Properties of Bismuth Telluride.** P. P. Konorov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 7, 1956, p. 1394-1405.

Electrical conductivity, Hall constant and coefficient of thermo-electric emf. of polycrystalline and single crystal samples of Bi_2Se_3 investigated over the range 20-700° K. and occasionally at liquid air temperatures. Same measurements on Bi_2Te_3. (P15, 2-63; Bi, *Se, Te*)

509-P. Measurement of Surface Tension at the Boundary Between Superconducting and Normal Phases. Iu. V. Sharvin. *Soviet Physics JETP,* v. 6, June 1958, p. 1031-1032. (Translation by American Institute of Physics.)

Surface tension between superconducting and normal phases determined by measuring the period of a simple laminar structure, obtained in a flat sample located in an inclined magnetic field.
(P15g, P13h; Sn)

510-P. Determination of Vapor Tension of Solid Cobalt in Iron Using Radioactive Isotopes. Yu. V. Kornev and V. N. Golubkin. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 299-311. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Data were obtained on the vapor tension of cobalt in the temperature range from 1050 to 1250; the heat of sublimation at the same temperatures; the ratio of the self-diffusion activating energy to the binding energy. 19 ref.
(P12c, P13, N1d; Co, Fe, 1-59)

511-P.* Pre-Irradiation Tests on U-Si Alloys. L. M. Howe and L. G. Bell. *Atomic Energy of Canada Ltd., CR-MET-763,* May 1958, 42 p.

Hardness, density, electrical resistivity and corrosion resistance as well as metallographic and X-ray examinations on U-Si core material. 7 ref.
(P-general, Q-general, 2-67; U, Si)

512-P.* Low-Temperature Resistivity of the Transition Elements: Ruthenium and Osmium. G. K. White and S. B. Woods. *Canadian Journal of Physics,* v. 36, July 1958, p. 875-883.

Experimental values for electrical resistivity of ruthenium and osmium from 2 to 300° K. and for thermal resistivity from 2 to 140° K. 19 ref. (P15g, 2-63; Ru, Os)

513-P.* Susceptibility of Lead-Telluride PbTe. Milos Matyas. *Czechoslovak Journal of Physics,* v. 8, 1958, p. 301-308.

Experiments and calculations demonstrating effect of temperatures from 90 to 600° K., various lattice defects, on susceptibility. 11 ref. (P16, 2-63; EG-j, Pb, Te)

514-P.* Susceptibility of Selenides and Tellurides of Heavy Elements. Milos Matyas. *Czechoslovak Journal of Physics,* v. 8, 1958, p. 309-314.

Temperature dependence of the susceptibility of PbSe, Sb_2Se_3, Sb_2Te_3, Bi_2Se_3 and Bi_2Te_3. The connection between the molar susceptibility of the characteristic crystal lattice of these semiconductors and the total number of electrons in their molecules is pointed out. 6 ref.
(P16, M24b, 2-63; EG-j, Sb, Se, Te)

515-P. Temperature Variation of Spontaneous Magnetization in Alloys Near the Curie Point. K. Belov and Ia. Paches. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p.

35-39. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 296-P, 1957.
(P16d; Ni)

516-P. Magnetic Properties of the Ordered Fe_3Al Alloy. V. I. Ivanovskii. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 53-57. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 397-P, 1957.
(P16, N10; Fe, Al)

517-P. (Russian.) **Heat Transfer and Thermal-Physical Properties of Molten Alkali Metals.** I. I. Novikov, A. N. Solov'ev, Ye. M. Khabakhpasheva, V. A. Gruzdev, A. I. Pridantsev and M. Ya. Vasenina. *Atomnaia Energiya,* no. 4, 1956, p. 92-106.

Heat transfer to liquid sodium in case of turbulent flow in a Cu or Ni tube. Procedures for measurement of viscosity, temperature conduction and density of the molten metals.
(P11, P10a, P10f; Cu, Ni, 14-60)

518-P. (Russian.) **Effect of Elastic Stresses and Thermal-Mechanical Working on Magnetic Properties of Certain Rigid Magnetic Materials.** M. G. Luzhinskaya and Ya. S. Shur. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 239-244.

Influence of elastic tension and torsion and also thermal-mechanical working on magnetic properties of alloys of following composition: 8% V, 50% Co, remainder Fe; 14% V, 52% Co, remainder Fe; and 15% Mn, remainder Fe.
(P16, Q21; Fe, Co, *V, Mn*)

519-P. (Russian.) **Method for Investigating the Electro-Deposition and Galvanic Corrosion of Cadmium.** O. K. Kudra and A. V. Gorodysskiy. *Izvestiia Kievskii Politekhnicheskii Instituta,* v. 17, 1956, p. 179-190.

To determine the relationship between the quality of electroplating and the current density used in its deposition, the preservation of the potential of Cd deposited on Pt, Ag, Cu and Fe is investigated as a function of current density.
(P15, L17, R11m; Cd)

520-P. (Russian.) **Electrochemical Investigation of Silver-Tellurium Alloys.** M. A. Klochko and Z. S. Medvedeva. *Izvestiia Sektora Fizika-Khimicheskogo Analiza Institut Obshchei i Neorganicheskoi Khimii imeni Akademii Nauk,* v. 27, 1956, p. 133-140.

Investigation of eight Ag-Te alloys, from pure Ag to 37.2% by weight Te, corresponding to the composition of the compound Ag_2Te. Products of electrolysis — sludge, electrolyte, cathodic precipitate, anode residues—examined; anodic and cathodic yields of Ag and Te determined.
(P15; Ag, Te)

521-P. (Russian.) **Solubility of Zinc in the Metal Compounds Cu_2Mg and Cu_2Cd.** Ye. I. Gladyshevskiy and P. I. Kripyakevich. *Izvestiia Sektora Fiziko Khimicheskogo Analiza Institut Obshchei i Neorganicheskoi Khimii imeni Akademii Nauk,* v. 27, 1956, p. 209-211.

At 400° Cu_2Mg dissolves 39 at.% Zn, Cu_2Cd dissolves 3 at.% Zn. The difference in the ability to dissolve is explained with the aid of the Brillouin-zone theory. The experimental values of C_{e1} (1.72 and 1.35) agree with the computed ones.
(P12e; Cu, Mg, Cd, *Zn*)

522-P. (Russian.) **Some Photo-Electric Properties of Antimony Trisulfide and Antimony Triselenide.** P. P. Brazdzhyunas and M. P. Mikal'kevichus. *Lietuvos TSR Mokslu Akademiia Darbai,* v. B2, 1956, p. 31-40.

Photoconductivity and absorption spectrum of crystalline and amorphous layers of Sb_2S_3 and Sb_2Se_3 in the temperature range −70 to 235° C.; spectral and temperature dependence of photosensitivity and of absorption coefficient in the region 400-1200 milimicrons.
(P17, 2-61; Sb, *S, Se*)

523-P. (Russian.) **Radiation-Colorimetric Method of Determining the Specific Heat of Metals.** A. P. Lyubimov and D. K. Belashchenko. *Sbornik Moskovskogo Instituta Stali.,* v. 33, 1955, p. 3-11.

Method based on simultaneous measurement of the temperature of the cooling specimen and of the quantity of heat delivered by the specimen to the surrounding medium. The specimen is placed inside a double-wall quartz cover and is first heated in vacuum by high-frequency current. The heat radiated by the specimen is absorbed by cooling water flowing between the walls of the cover, and is determined from the temperature difference of the cooling water ahead and past the cover. The specific heat was determined for Fe-C, Fe-Cu and Armco-iron alloys at 250-950°
(P12r, 2-54; Fe)

524-P. (Russian.) **Anodic Polarization of Chromium.** R. I. Agladze and T.

V. Ionatamishvili. *Trudy Instituta Metalla i Gornogo Dela Akademiia Nauk Gruzinskoi SSR,* v. 7, 1956, p. 157-174.

Anodic polarization curves of Cr, Fe and ferrochrome measured for different solutions and current densities of up to 30 amp. per sq.dm. at 35° C. (P15; Cr)

525-P. (Russian.) **Certain Properties of Surface-Active Metals.** N. L. Pokrovskiy. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1383-1386.

The surface tension of solutions of Te in liquid Sn was measured at 250 to 550° C. Te has considerable surface activity which diminishes with increasing temperature and is commensurate with the surface activity of sodium dissolved in tin. (P13h; Te, Sn)

526-P. Heat Capacities, Antropies and Enthalpies of Tantalum Between 12 and 550° K. [1, 2] K. F. Sterrett and W. E. Wallace. *American Chemical Society, Journal,* v. 30, July 5, 1958, p. 3176-3177.

Heat capacities of tantalum measured between 12 and 550° K. with a precision of 0.15% or better. 12 ref. (P12r, 2-63; Ta)

527-P. Magnetic Properties of Magnetite at Low Temperatures. N. S. Korolevskaya and A. S. Mil'ner. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 186-188. (Henry Brutcher, Altadena, Calif., Translation no. 4258.)

Experimental study of cause of difference in the transformation temperatures of magnetite when cooled inside as against outside a magnetic field. (P16; 2-63, RM-n, Fe)

528-P. (Russian.) **Thermodynamics of Irreversible Processes in a Polarized Magneto-Elastic Medium.** K. B. Vlasov. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 385-389.

7 ref. (P12, P16)

529-P. (Russian.) **Semi-Conductivity in the Multiple Electron Theory.** E. N. Agafonova and N. P. Kontorovich. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 402-405.

7 ref. (P15g; EG-j)

530-P. (Russian.) **Theory of Electromagnetic Effects in Metals.** F. G. Bass, M. I. Kaganov and V. V. Slezoo. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 406-411.

(P16)

531-P. (Russian.) **Magnetic Properties of Magneto-Anisotropic Samples of Ferromagnetic Powders. Pt. 2. Relation of the Magnetizing Curves on the Method of Producing the Demagnetized State.** Ya. S. Shur, E. V. Shtol'ts and G. S. Kandaurova. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 421-427.

(P16; Fe, 6-68)

532-P.* How Radiation Damages Metals. M. J. Makin. *Atomics and Nuclear Energy,* v. 9, Aug. 1958, p. 260-263.

Effects of high energy radiation on metals from theoretical and practical viewpoints. Four particle-metal interactions described. 23 ref. (P-general, Q-general, 2-67)

533-P.* Note on the Rate of Evolution of Hydrogen at a Magnesium Anode. J. H. Greenblatt. *Canadian Journal of Chemistry,* v. 36, Aug. 1958, p. 1138-1140.

Mechanism of anodic dissolution of Mg reviewed. Temperature dependence of rate of hydrogen evolution at Mg anodes during electrolysis. 10 ref. (P15; Mg, *H*)

534-P.* Electrical Conductivity of Manganese Arsenide and Antimonide. Gaston Fischer and W. B. Pearson. *Canadian Journal of Physics,* v. 36, Aug. 1958, p. 1010-1016.

Conductivity determined for MnAs and MnSb from 40 to 200° C.; ferromagnetic, paramagnetic states studied. 11 ref. (P15g; Mn, As, Sb)

535-P.* Neutron Bombardment of Reactor Metals. Robert S. Barnes. *Times Review of Industry,* v. 12, Aug. 1958, p. 20-21, 24.

Effect of bombardment on reactor construction materials and fuel elements; change in properties, dimensions, gas evolution. (P18, T11)

536-P. Influence of Elastic Stresses on the Magnetic Properties of the Alloy Vicalloy. Ia. S. Shur, M. G. Luzninskaia and L. A. Shubina. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 40-44. (Translation by Pergamon Institute.)

Influence of unilateral elastic extension and elastic torsion on the magnetic properties of the high-coercivity alloy Vicalloy (12% V, 52% Co, residue Fe). Samples were investigated in the form of wires. Extension leads to an increase in

coercive force of several times and likewise to a growth of the remanent induction. The increase of coercive force obtained is explained by an increase in the anisotropy of single-domain formations on account of the growth of the anisotropic stress.
(P16, Q21; Co, Fe, V, SGA-n)

537-P. Thermomechanical Treatment of Vicalloy. Ia. S. Shur, M. G. Luzhinskaia and L. A. Shubina. *Physics of Metals and Metallography,* v. 4, no. 1, p. 45-52. (Translation by Pergamon Institute.)

Alloy containing 52% Co, 12% V, balance Fe was investigated in the form of cold drawn wires. Thermomechanical treatment consisted in superimposing unilateral tensile stress on the samples at time of annealing, and as a result high coercive force was obtained. This treatment can appreciably alter the magnetic properties, and under certain conditions coercive force can be increased by 25% and maximum magnetic energy by 40-50%. 7 ref.
(P16, 2-64; Fe, Co, V)

538-P. The Dependence of the Magnetic Properties of Metallo-Ceramic Permanent Magnets on Porosity. A. B. Alt'man. *Physics of Metals and Metallography,* v. 4, no. 1, 1957, p. 65-68. (Translation by Pergamon Institute.)

Influence of the porosity of metallo-ceramic permanent magnets made from the alloys Alni, Alnico, Magnico and Cunico on their magnetic properties. Some empirical formulas are advanced, expressing the dependence of the magnitude of the maximum magnetic energy and residual induction of the magnets on the concentration of pores in them. 4 ref.
(P16, P10m; SGA-n, 6-70)

539-P. Influence of Surface Treatments on the Chemical Behavior of Metals. T. P. Hoar. Paper from "Effect of Surface on the Behaviour of Metals", Philosophical Library, 1958, p. 29-40.

Chemical reaction of a metal surface almost always involves the loss of cations and electrons from the metal. Reaction is accelerated by anything that assists the loss of either cations or electrons or both, and retarded or stopped by anything that interferes with such loss. Cation egress is assisted by mechanical removal of any oxide film and by production of dissaray in the metal surface by, for example, abrasion, or other forms of cold work. Cation egress can be retarded by surface treatments giving films that are impervious to cation except at high field strengths. 18 ref. (P13)

540-P.* (French.) **Change in the Specific Mass of Uranium After Cold Working and During Annealing.** Jean-Pierre Mustelier. *Comptes Rendus,* v. 246, June 16, 1958, p. 3347-3350.

Loss of density was noted after cold working. In cold worked specimen subjected to a series of 1-hr. anneals at increasing temperatures, abrupt increase in density, corresponding to recrystallization, occurred at about 450° C. Final anneal of one month at 630° gave specimen almost same density as before cold working. Variations in density are attributed to formation and disappearance of defects (vacancies, interstitial atoms, dislocations) in crystal lattice.
(P10a, 2-64, 3-68, M26s; U)

541-P.* (French.) **Secondary Electronic Emission of Metals Bombarded by Positive Ions.** Georges Slodzian. *Comptes Rendus,* v. 246, June 30, 1958, p. 3631-3634.

Table of coefficients of secondary electronic emission of metals under bombardment by ions of air and argon. Measurements show that these coefficients can vary considerably with the nature and condition of specimen. Bombarding device prevents contamination of target.
(P15k, 1-53)

542-P.* (French.) **Applications of Cold in Metallurgy.** G. de Smet. *Pratique des Industries Mecaniques,* v. 44, June 1958, p. 141-153.

Behavior of metals at low temperature; cooling fluids and equipment; shrink fitting; structural transformations in cold hardened steels; spontaneous hardening; structural and dimensional stabilization of some metals at subzero temperatures; low-temperature ductility tests. 38 ref.
(P-general, Q-general, 2-63, J26q)

543-P. (Russian.) **New Methods for Determining the Heat of Melting and Transformation of Metals.** A. I. Lazarev. *Issledovaniya v Oblasti Teplovykh Izmereniy. Moskva-Leningrad, Mashgiz,* 1956, p. 21-31.

Transformation heat measured by placing two identical hollow specimens, one of which contains the heater, in the chamber of a metallic

block calorimeter, the temperature of which varies linearly with time. To measure the melting temperature, one of the specimens, made of metal having a known specific heat, is made solid. The second specimen is made hollow and the metal having the unknown melting temperature is placed in its cavity. The heat of eutectoid transformation in steel with 0.83% carbon (14.53 cal. per g.) and the melting heat of lead (6.0 cal. per g.) were measured. (P12q, 1-54; CN, Pb)

544-P. (Lithuanian.) **Some Photoelectric Properties of Antimony Trisulphide (Sb_2S_3).** P. P. Brazdzhyunas and M. Mikal'kevichus. *Mokslo Darbai. Vilniaus Valstybinis Universitetas Matemortiokos Fizikos ir Chemijos Mokslu Serijos,* no. 5, 1956, p. 57-68.

A layer of Sb_2S_3 containing an excess of S was obtained by the sublimation of Sb_2S_3 in vacuum. The curve giving the dependence of the photosensitivity on the amount of excess S shows a sharp maximum. The spectral characteristic of the photosensitivity was investigated. (P17; Sb)

545-P. (Russian.) **Optical Properties of Intermetallic Compounds. Zinc-Antimony Compound.** K. D. Sinel'nikov, T. N. Shklyarewskiy and Y. A. Lupashko. *Uchenye Zapiski Khar'kovskogo Universiteta,* v. 64, 1955, p. 141-144.

Determination of specific conductivity, transparency and absorption coefficient of ZnSb films from 350-1500 millimicrons. The optical density in the region of 400 to 1000 millimicrons is independent of the temperature in the range from 20 to 100° C. (P17; Zn, Sb)

546-P. (Ukrainian.) **Viscosity and Structure of Liquid Solutions of Zinc, Cadmium, Tin, Bismuth and Lead in Mercury.** A. Z. Golik and N. A. Ryndich. *Ukrains' kii Fizichnii Zhurnal,* v. 1, no. 2, 1956, p. 170-182.

The viscosity obeys an exponential law in the temperature range under investigation. The energy of activation of viscous flow is a linear function of the concentration. The density diminishes linearly with increasing temperature. (P10f, P10a; Zn, Cd, Sn, Bi, Pb, Hg, 14-60)

547-P.* (French.) **Variations in Length and Density During Charging of Zirconium in Hydrogen.** L. Espagno, P. Azou and P. Bastien. *Comptes Rendus,* v. 247, July 7, 1958, p. 83-86.

Charging in H provokes linear variation in length and density of Zr. These variations are sufficiently pronounced to be easily used for determination of gas content. (P10a, P10d; Zr, *H*)

548-P.* (French.) **Apparatus for Measuring Resistivity at Ambient and High Temperatures. First Applications to the Study of Uranium-Molybdenum Alloys.** J. Bellot, N. Sacovy and J. M. Henry. *Metaux, Corrosion-Industries,* v. 33, June 1958, p. 243-252.

Two apparatuses described, one for measuring resistivity at room temperature, one for measurements up to 1000° C. Transformation kinetics of some U-Mo alloys at room temperature; interpretation of mechanism of return to equilibrium from supersaturated gamma phase. 11 ref. (P15g, N9n, 1-53; U, Mo)

549-P.* (French.) **Some Physical Properties of Gallium Monocrystals Near the Melting Point.** Marc Ernv. *Metaux, Corrosion-Industries,* v. 33, June 1958, p. 253-269.

Preparation of monocrystals; X-ray study of crystal structure. Study of symmetry from 20° C. to melting point (29.75° C.) by means of Laue back reflection patterns showed that Ga crystals belong to orthorhombic system in range from 20 to over 29.5° C. above which point trihedral formed by crystal axes changes orientation. This phenomenon is attributed to pronounced anisotropic expansion or contraction of crystal. Study of anisotropy of electrical resistivity at 20° revealed that speed of propagation of elastic waves varies with direction of propagation; similarly, resistivity varies with direction of current with respect to crystal axes. (To be continued.) (P15g, M26, 2-62; Ga)

550-P. (Russian.) **Thermal and Electric Properties of Alloys of Copper.** V. Ye. Mikryukov. *Vestnik Moskovskogo Universiteta Seriya Matematiki, Mekhaniky, Astronomii Fiziki Khimii,* no. 2, 1956, p. 53-70.

Investigation within a range from room temperature to 600° of electric conductivity and thermal conductivity of Cu to which small amounts of Cr, Ni, Zr, Al, Be and Ta were added. The alloys were

investigated in two states; normalized and tempered after quenching. (P11h, P15g, 2-60, 2-64; Cu-b)

551-P.* (English.) **The Wiedemann Effect of the Binary System of Iron-Aluminum Alloys at High Temperatures.** Yuki Shirakawa, Toru Ohara and Takeshi Abe. *Tohoku University, Science Reports of the Research Institutes,* v. 10, no. 3, June 1958, p. 212-218.

Wiedemann effect at 70 to 700° C. of annealed specimens of Fe-Al alloys containing up to 17% Al. Relation between torsion of specimen and circular field current, longitudinal field strength, temperature and Al content. 4 ref. (P16; Fe-b, Al)

552-P.* (English.) **Theory of the Wiedemann Effect.** Mikio Yamamoto. *Tohoku University, Science Reports of the Research Institutes,* v. 10, no. 3, June 1958, p. 219-239.

Derivation of a general expression for the Wiedemann effect or the torsion angle in a cylindrical rod of ferromagnetic substance fixed at its one end and magnetized by a longitudinal magnetic field parallel to and by a circular field around its rod axis. 16 ref. (P16)

553-P. (Russian.) **Radioactive Isotope Study of the Behavior of Antimony in Electrolytic Copper Refining.** S. G. Filimonova. *Nauchno-Tekhnicheskii Informatsionnyi Byuleten' Leningradskogo Politekhnicheskogo Instituta,* no. 3, 1957, p. 19-31.

Influence of various factors on the inclusion of Sb in electrolytic Cu in the process of refining, using the radioactive isotope Sb^{124}. Sb passes into Cu as the result of discharge of Sb^{5+} ions, which starts at potentials of 0.23 to 0.24 v. The more positive potential of discharge of Sb ions in the process of Cu refining indicates the depolarization at a simultaneous discharge of Sb and Cu ions.
(P15m, C23p, 1-59; Cu, *Sb*)

554-P. (Russian.) **Cathode Polarization on Alloy Formation. Study of Co-Ni Alloys.** V. M. Kochegarov, A. L. Rotinyan and N. P. Fedot'yev. *Trudy Leningradskogo Instituta Imeni Lensoveta,* v. 40, 1957, p. 112-123.

Cathode polarization on simultaneous and separate electrolytic precipitation of Co and Ni studied at various temperatures and various electrolyte concentrations. In case of electrolytic precipitation from a mixed solution, the partial cathode polarization curves for Co precipitation shift to the positive side more sharply than in case of Ni precipitation. Depolarization is caused by formation of a solid solution and super-polarization is caused by difficulties in formation of an overall crystalline lattice.
(P15, N12d, C23; Co, Ni)

555-P. (Russian.) **Internal Stresses in Electrolytic Precipitations of Copper.** A. A. Khonikevich and N. P. Fedot'yev. *Trudy Leningradskogo Instituta Imeni Lensoveta,* v. 40, 1957, p. 133-142.

Influence of an addition of colloid and surface tension lowering substance on the internal stresses in Cu, microhardness and cathode potential. Cu was precipitated from the solution of 250 g. per liter of $CuSO_4 \cdot 5H_2O$ + 50 g. per liter of H_2SO_5 at room temperature.
(P15, Q25h, C23; Cu)

556-P. (Russian.) **Ionization X-Ray Study of Bismuth Telluride Structure.** F. I. Vasenin and P. F. Konovalov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 7, 1956, p. 1406-1414.

To investigate the nature of the sign inversion of the thermo-emf., an X-ray study near the stoichiometric composition Bi_2Te_3 was carried out. The thermo-emf. was measured before the alloy was pulverized (for preparing samples for X-ray photographing) by the method of compensation. X-ray photographing was carried out with an ionization installation. Two modifications of Bi_2Te_3 were observed.
(P15, M26q; Bi, Te)

557-P. (Russian.) **Study of Cathode Polarization on Electrolytic Precipitation of Nickel-Tungsten Alloys.** T. F. Frantsevich-Zabludovskaya and A. I. Zayats. *Zhurnal Prikladnoi Khimii,* v. 30, no. 5, 1957, p. 723-729.

Cathode polarization from tartaric ammonium electrolytes and structure of Ni-W precipitates studied. The Ni-W alloy separated with considerable depolarization with reference to W and insignificant depolarization with reference to Ni (30 to 60 mv.). The Ni-W alloy is a one-phase solid solution of W in Ni. The alloy lattice is face-centered cubic characteristic of Ni; the higher the W content, the more the

lattice parameters increase.
(P15, N12d; Ni-b, W)

558-P. (Russian.) **Electrolytic Transfer of Carbon in Liquid Iron-Carbon Alloys.** M. A. Rabkin. *Zhurnal Prikladnoi Khimii,* v. 30, no. 5, 1957, p. 791-794.

Electrolytic transfer of C in liquid Fe-C alloys containing 0.72% Mn, 1.88% Si, 0.052% S and 0.074% P studied at 1300 to 1400° C. Carbon varied from 2.74 to 0.008%. A noticeable drop in concentration of C and S from the anode to the cathode took place, when a current of 0.08 to 0.1 amp. per sq. mm. was passing through at a voltage of 2.3 to 3 v. The greater the duration of the action of the electric field, the greater the concentration differences.
(P15; Fe-b, *C,* 14-60)

559-P.* **Photoconductivity in Chemically Deposited Films of Lead Selenide.** D. H. Roberts and J. E. Baines. *Physics and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 184-189.

Measurements on photoconductive films of lead selenide indicate that a variation of the hydrazine hydrate concentration used in the deposition leads to a variation in the thermal and optical activation energies from 0.27 to 0.60 ev. This is explained by postulating the existence of potential barriers in the film produced by variations in the Fermi energy. 9 ref. (P17, P15; Pb, Se)

560-P.* **Extreme Frequencies of Lattice Vibrations for Disordered Binary Alloys.** G. F. Newell. *Physics and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 190-194.

The extreme frequencies of various branches of the spectrum for a binary substitutional alloy can be estimated by using a variational procedure. In particular, the maximum frequency of the optical modes can be determined approximately as a function of the various force constants and the composition. 5 ref. (P17, M26; N10)

561-P.* (English.) **Electrode Potential Behavior of Titanium in Solutions Initially Free From Metal Ions.** E. M. Khairy and M. M. El Khatib. *Egyptian Journal of Chemistry,* v. 1, no. 1, 1958, p. 47-55.

On the basis of experiments with Ti electrodes in unstirred buffer solutions of a pH range 1 to 12 and in the same solutions stirred with N or O, a protective film of TiO_2, covered in its turn with oxygen doublets, is assumed. Potential thought to be governed by a $Ti/Ti^{+++}/TiO^{++}$ system subject to varying overvoltage effects. Stirring with H, subjecting the electrode to reducing action of H and to high vacuum, activates its surface and reduces the potential for pH=O. Antimony plating increases potential. Computed equilibrium constant $^{a}TiO^{++}/^{a}Ti^{+++} = 10^{3}$. 9 ref. (P15m; Ti)

562-P.* (English.) **Electrode Potential Behavior of Titanium in Fluoride Media.** E. M. Khairy and M. M. El Khatib. *Egyptian Journal of Chemistry,* v. 1, no. 1, 1958, p. 65-73.

Behavior of spectrographically pure Ti rods in buffer solutions of pH 2 to pH 12 with dissolved potassium fluoride in varying concentrations. A protective layer of dioxide assumed on the Ti surface. A remarkable attack of the fluoride ions on the layer is thought to take place if they are present in a concentration greater than one mole, forming TiF_6—as well as on the metal, penetrating through pores of the layer and forming Ti^{+++} ions. 6 ref. (P15m; Ti)

563-P.* (English.) **Anodic Behavior of Titanium at Low and High Current Densities With Particular Reference to the Specific Effect of the Fluoride Ion.** E. M. Khairy and M. M. El Khatib. *Egyptian Journal of Chemistry,* v. 1, no. 1, 1958, p. 75-85.

Anodic behavior of Ti subjected to low current densities in buffer solutions of pH 1.81, pH 7.1 and pH 12, and subjected to high current densities in solutions of pH 1.81, pH 7 and pH 10.88 is studied both in the absence and presence of fluoride ions, ranging over a concentration of dissolved KF from 4 to 10^{-2}N. The presence of fluoride ions caused a remarkable corroding effect in acid media. Passivity up to O-evolution was observed over a larger range of current density in the absence of fluoride ions than in the presence of fluoride ions.
(P15; Ti)

564-P. (Czech.) **Temperature Dependence of Thermo-EMF of Gray Sn With Admixtures of Cd.** Petko R.

Kamadziev. *Ceskoslovensky Casopis pro Fysiku,* v. 6, no. 4, 1956, p. 426-430.

The conductivity and thermo-emf. of gray Sn containing 2.8×10^{18} atoms of Cd in 1 cc. were measured in the range from —183 to +10° C. (P15g, 2-61; Sn)

565-P.* (Czech.) **Effect of Heat Treating Magnetic Soft Material in Magnetic Field on Some Magnetic Properties.** Vladimir Havel. *Hutnicke Listy,* v. 13, no. 7, 1958, p. 587-594.

Influence of heat treating in a magnetic field on the maximum permeability of cast steel with 4.8 to 6.5% Si and cold worked sheets containing 3% Si. Holding time near Curie temperature was 6 min. with maximum outside magnetic field of 300 A. per cm. Cooling velocity was controlled. Results showed substantial rise in maximum permeability value after thermomagnetic treatment, in comparison with results after heat treatment. 10 ref. (P16, 2-64; AY, *Si*)

566-P.* (Czech.) **Development of a Ductile Permanent Magnet Alloy.** Zdenek Tischer. *Hutnicke Listy,* v. 13, no. 7, 1958, p. 669-674.

Production of 20% Ni, 20% Fe, 60% Cu alloy. Mechanical and heat treatment to produce desired magnetic properties in isotropic and anisotropic states. Alloy exhibits high ductility, low hardness, good machinability and workability. 13 ref. (P16, Q-general; Cu-b, *Ni, Fe,* SGA-n)

567-P. (Russian.) **Investigation of the Effect of Iodine Impurity on the Physical Properties of Selenium.** M. I. Aliyev. *AzerbSSR elmler Akademii kheberleri, Izvestiya Akademii Nauk AzerbSSR,* no. 5, 1957, p. 9-25.

At low annealing temperatures (60 to 80° C.), an iodine impurity accelerates the crystallization of Se. As the annealing temperature is increased, the influence of the amount of impurity is gradually weakened and at 90° C. there is no difference in the degree of crystallization of pure Se and that with an impurity of iodine. Iodine impurity increases the electric conductivity, which is greatest with an iodine concentration of 0.1%. Iodine decreases the thermal emf., increases thermal conductivity.
(P11h, P15g, 3-69; Se)

568-P. An Introduction to Metallurgical Thermodynamics. J. N. Pratt. *Birmingham Metallurgical Society, Journal,* v. 38, June 1958, p. 56-75.

Important principles of thermodynamics and relevance to metallurgy. (P12a, P12r, P12s)

569-P. Influence of Surface on the Physical Properties of Metals. R. W. B. Stephens. Paper from "Effect of Surface on the Behaviour of Metals", Philosophical Library, 1958, p. 71-100.

Methods of examination of magnetic, thermal and optical properties, with special reference to the electron theory of metals. 31 ref. (P general, M25)

570-P. Guide to Ferromagnetic Ceramics. Pt. 1. How Ferrites Work, Properties of Soft Ferrites. George Economos. *Materials in Design Engineering,* v. 48, Sept. 1958, p. 96-101.
(P16; SGA-n, NM-f)

571-P. Cyclotron Resonance in Metals. M. Ya. Azbel and E. A. Kaner. *Physical and Chemistry of Solids, Journal,* v. 6, Aug. 1958, p. 113-135. 23 ref. (P18m)

572-P. (German.) **Distribution of Calcium Impurities in Aluminum and Their Influence on the Electric Conductivity of the Metal.** A. Domony. *Acta Technica,* v. 21, no. 3-4, 1958, p. 295-306.

Calcium found in Al as a salt, rather than in metallic form, causes marked reduction in electrical conductivity, makes degassing more difficult. 12 ref. (P15g, 3-69; Al. *Ca*)

573-P. (Russian.) **New Method for Measuring Thermodynamic Characteristics of Hard Metals.** A. A. Zhykhovitskii and A. G. Golitskyn. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 128-129.
4 ref. (P12; EG-d)

574-P. (Russina.) **Study of Kinetics of Intermetallic Compounds.** V. M. Glazov. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 824-828.

Viscosimetric method used for volumetric study of slowly forming reactions in intermetallic compounds. 12 ref.
(P13b; 14-68)

575-P.* **Low-Temperature Heat Capacity of Bismuth and Tungsten.** War-

ren DeSorbo. *Journal of Physical Chemistry,* v. 62, Aug. 1958, p. 965-967.

Heat capacities of Bi and W measured in the temperature region 15-90° K. At 298.1° K., the entropies of these two metals have been re-evaluated. That of bismuth is 13.56 ± 0.05 cal. g. atom^{-1} deg.$^{-1}$, while that of tungsten is 8.2 ± 0.2 cal. g. atom^{-1} deg.$^{-1}$. The variation in the Debye characteristic temperature in the liquid hydrogen-liquid nitrogen temperature region for Bi is similar to that chacteristic of "layer-like" lattices, while that for W is typical of some of the isotropic lattices.
(P12r, 2-63; Bi, W)

576-P. The Useful Heat Capacity of Several Materials for Ballistic Nose-Cone Construction. J. R. Stalder. *National Advisory Committee for Aeronautics,* TN 4141, Nov. 1957, 19 p.

Heat absorption characteristics of Cu, Inconel-X, graphite, and Be. Significant weight saving in a ballistic missile heat sink by use of graphite or Be in place of Cu. Inconel-X was unsatisfactory because of its low thermal conductivity. Large errors in computed temperature distributions in materials can arise if the variation of thermal properties with temperature is not taken into account. (P12r, T24e, 17-57; Cu, Ni, Be, NM-k36)

577-P. Investigation of Alloys of Magnesium and Their Properties. Pt. 2. Thermal and Electrical Properties of Magnesium-Base Alloys. H. Baker. Dow Chemical Co. *U. S. Office of Technical Services,* PB 131436, Sept. 1957, 29 p. $.75.

Electrical resistivities for cast AZ31A and B, AZ63A, AZ81A, AZ91C, AZ92A, AM100A, EK30A, EK41A, EZ33A, HK31A, rolled HK31A and HM21XA, and cast HZ32A determined at room temperature and in some cases up to 500° F. The temperature coefficients of electrical resistivity were fairly constant ranging from 0.8 to 1.0 microhm per cc. per ° F. The temperature coefficients of thermal conductivity were all positive and decreased with increasing temperature. (P15g, P11h; Mg-b)

578-P.* (Polish.) **Solubility of Oxygen in Solid Silver.** Wladyslaw Domanski. *Archiwum Hutnictwa,* v. 3, no. 2, 1958, p. 81-96.

Thermodynamic analysis on the basis of experimental data. Probable occurrence of oxygen in solid Ag as chemical compound Ag_2O. Calculations give plain lineal relation for logarithm of the activity coefficient of Ag_2O. 8 ref.
(P12e, P12b; Ag, *O*)

579-P. Hydrogen in Titanium and Titanium Alloys. D. N. Williams. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121643, May 1958, 110 p. $2.50.

Reviews and correlates research information. Factors of most significance are the temperature dependence of hydrogen solubility in alpha and beta Ti, hydrogen partial pressure and alloy composition. These factors control absorption, embrittlement, degassing and many other changes observed in hydrogen-containing Ti alloys.
(P12e, Q26s; Ti-b, *H*)

580-P.* Anodic Behavior of Nickel: Pt. 1. Effect of Components of Electrolyte. Nelson F. Murphy and Bharat C. Oza. *Virginia Polytechnic Institute, Bulletin,* v. 51, May 1958, p. 3-18.

Anode potential and current density at which Ni became passive was a reproducible value that increased as the temperature increased; effect of the chloride ion in destroying the passivity of Ni was studied quantitatively; presence of co-existing sulphate and chloride ions was shown to counteract the effect of Ni ions; limiting current density was increased by the presence of sulphate ion, the magnitude of the increase depending on the concentration of Ni in the solution. Boric acid did not affect the limiting current density very much at low concentrations of Ni ions, but had effect at higher Ni ion concentrations. (P15m; Ni)

581-P.* Defects in Solids and Current Concepts of Radiation Effects. G. J. Dienes. Paper from "Effects of Radiation on Materials", 1958, Reinhold Publishing Corp., p. 1-47.

Reviews radiation induced disturbances including vacancies, interstitial atoms, thermal spikes, impurity atoms, ionization effects, displacement spikes and replacement collisions. Theoretical calculations of the number of displaced atoms and threshold energy for displacement are compared with the results of experimental determinations for metallic and nonmetallic solids. Changes in electrical resistivity, dimensional changes, diffusion mecha-

nism, stored energy, Young's modulus, shear stress, ductile-to-brittle transition and other mechanical properties upon exposure to radiation. 130 ref.
(P-general, Q-general, M26, 2-67)

582-P.* Radiation Effects in Metals and Alloys. D. S. Billington. Paper from "Effects of Radiation on Materials", 1958. Reinhold Publishing Corp., p. 99-125.

Effects of neutron irradiation on density, thermal properties, magnetic properties, electrical resistivity, microstructure, crystal structure, hardness, yield strength, shear strength, Young's modulus, precipitation reactions and diffusion coefficients of metals and alloys. Influence of melting point, crystal structure, prior thermal and mechanical history, neutron flux, temperature, chemical environment, stress level and composition on the effects of irradiation. 54 ref.
(P-general, Q-general, M26, M27, N1, N7, 2-67)

583-P.* Effects of Radiation on the Core Components of Nuclear Reactors. C. E. Weber. Paper from "Effects of Radiation on Materials", 1958, Reinhold Publishing Corp., p. 191-212.

Behavior under radiation of fuel elements, poison control elements and structural members; effect of radiation on dimensional stability, physical properties and mechanical properties. Designing reactor components to minimize radiation damage. 27 ref. (P10d, P-general, Q-general, T11, 2-67)

584-P.* Effects of Radiation on Shielding, Moderators, and Auxiliary Components of Nuclear Reactors. Gerhart R. Hennig. Paper from "Effects of Radiation on Materials", 1958, Reinhold Publishing Corp., p. 213-242.

Radiation damage and effect on physical and nuclear properties of shielding, associated nuclear materials, liquid moderators and solid moderators. 53 ref. (P18, T11, 2-67)

585-P.* Bibliography: Effect of Irradiation on Solids. Helen C. Friedemann. Paper from "Effects of Radiation on Materials", 1958, Reinhold Publishing Corp., p. 305-338.

Extensive bibliography lists material published through 1956 on theories considering mechanism of radiation damage and effects of irradiation on properties of metals and other solids. 779 ref.
(P-general, Q-general, 2-67)

586-P.* (German.) **Contraction After Strain Observed on a Steel With 12% Chromium and 1% Molybdenum.** Karl Bungardt, Martin Bauser and Heribert Sychrovsky. *Archiv für das Eisenhüttenwesen,* v. 29, July 1958, p. 415-422.

A steel with 0.15% C, 12.6% Cr and 1.05% Mo was hardened and annealed and then subjected to tests to determine contraction after strain, its influence upon creep properties, relation to time of load application, creep period from which load is released, amount of load and temperature. The contraction after strain follows a logarithmic time pattern before reaching a limit. It is greater in proportion to the amount of stress applied as well as the temperature. 28 ref.
(P10d, Q3; SS)

587-P.* Mechanism of Growth of Uranium on Thermal Cycling in the Alpha Range. S. F. Pugh. *Institute of Metals, Journal,* v. 86, Aug. 1958, p. 497-503.

Growth of wrought U bar during thermal cycling between room temperature and higher temperature in the range arises from the differences in expansion in the axial direction of the grains of the two components of the rolling texture, combined with a change in the mode of plastic deformation in this temperature range. At the upper cycling temperature, the internal stress is relaxed by a thermally activated process. 18 ref. (P10d, 2-61; U)

588-P.* Effects of Radiation on Metals. Michael Ference, Jr. *SAE Transactions,* v. 66, 1958, p. 47-53.

The effectiveness of materials in absorbing radiation; the basic mechanisms of the interaction of radiation and matter—to determine the changes on the mechanical properties of materials; radiation as a convenient and economical source of energy for irradiation of chemical systems. 14 ref.
(P17c, Q-general; 2-67)

589-P.* Physical Constants, Crystal Structure, and Thermodynamic Properties. J. F. Smith. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 133-147.

Crystallography; density, elasticity and hardness; linear coefficient of thermal expansion; melting point

and heat of fusion; vapor pressure, heat of vaporization and boiling point; reported values for temperature dependence of electrical resistivity; emissivity; thermal conductivity and thermal diffusivity. 15 ref. (P-general; Th)

590-P.* Electronic Structure of Thorium Metal. Ted G. Berlincourt. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 148-160.

Experimental data for the electronic specific heat, magnetic susceptibility, Hall effect, electrical resistivity, magnetoresistivity, superconductivity and thermo-electric effect of Th. 21 ref. (P15, P16; Th)

591-P.* Effects of Irradiation Upon Thorium. Frank G. Foote and J. Howard Kittel. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 277-281.

Thorium and high thorium-uranium alloys are resistant to dimensional changes even at high burnups. Other properties, such as hardness, tensile strength and conductivity, show modest changes, but the situation with regard to tensile strength is not clear. 6 ref. (P10d, Q-general, 2-67; Th)

592-P. (Book.) Effect of Surface on the Behaviour of Metals. 1958, 100 p. Philosophical Library Inc., 15 E. 40th St., New York 16, N. Y. 21 sh.

Lectures delivered at Institution of Metallurgists' Refresher Course 1957. Papers are abstracted separately. (P13, Q9)

593-P. (Book.) Effects of Radiation on Materials. J. J. Harwood, Henry H. Hausner, J. G. Morse and W. G. Rauch. 1958. 355 p. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. $10.50.

Experimental approaches to study; effects of radiation on physical, metallurgical and corrosion properties of metals and alloys. Effects on dielectric materials, semiconductors, nuclear reactor components and organic compounds. Papers abstracted separately.
(P-general, Q-general, 2-67)

594-P. Temperature Dependence of Magnetic Properties of Silicon-Iron. C. W. Chen. *Journal of Applied Physics,* v. 29, Sept. 1958, p. 1337-1343.

Permeability, coercive force, remanence and hysteresis and core losses of a 3% singly oriented Si-Fe alloy measured in the range 30 to 700° C. Their temperature dependence is interpreted in terms of either the intrinsic properties of a ferromagnetic or domain theory. The magnetization curve is analyzed on the basis of the crystallographic characteristics of the texture in the material. Domain distribution is discussed at each stage of magnetization. Application of the analysis leads to the establishment of the relationship between the temperature coefficient of permeability and the magnetization processes. (P16, 2-61; Fe-b, *Si,* SGA-n)

595-P.* Thermal Properties of Mobile Defects. Andrew Granato. *Physical Review,* v. 111, Aug. 1, 1958, p. 741-746.

Using simplified models, calculations are made for the contribution of mobile dislocations and small-angle boundaries to the specific heat and thermal resistivity of crystals. The specific heat is found to be proportional to T and T^2, and the lattice resistivity approximately to T^{-n} (where n lies between 3 and 7/2 for the usual range of measurements) and T^{-5} for mobile dislocations and mobile small-angle boundaries, respectively, over a range of low temperatures, but eventually both go to zero in the limit as the temperature approaches zero.
(P12r, P11h)

596-P.* Theory of the Anharmonic Properties of Solids. Edward A. Stern. *Physical Review,* v. 111, Aug. 1, 1958, p. 786-797.

A theory with which one can calculate the anharmonic properties of solids such as thermal expansion, temperature dependence of elastic constants, dependence of elastic constants under stresses, and the deviation of the specific heat from the Dulong-Petit law at high temperatures. The theory is applied to sodium under the assumption of a special force interaction between nearest neighbors only.
(P11g, P12r, Q21e)

597-P.* Quenched Imperfections and the Electrical Resistivity of Aluminum at Low Temperatures. Warren DeSorbo. *Physical Review,* v. 111, Aug. 1, 1958, p. 810-812.

Electrical resistivity of a high-purity Al specimen, having different concentrations of "quenched in" lattice defects is reported for the temperature region 1-20° K. For small and different concentrations of structural impurities, the resistivity follows Matthiessen's rule. The exponential constant, n, in the equation, $p = pi + AT^N$, is equal

to 2.7 for the sample in a well-annealed state. This number increases slightly with an increase in defect concentration.
(P15g, M26s, 2-63; Al)

598-P. Effects of High Temperature on the Performance of Alnico V and Alnico VI Permanent Magnets. W. H. Roberts and D. L. Mitchell. General Electric Co., Atomic Products Div. *U. S. Atomic Energy Commission APEX-384,* Feb. 1957, 90 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.25.

Design parameters and limitations of permanent magnets for applications involving high and low temperatures and vibration. Temperature range in the investigation included —70° C. to 600° C., with the emphasis placed on long-time operation at 500° C.
(P16, 2-62; Al, Ni, SGA-n)

599-P.* (English.) **Note on the Magnetic Susceptibility of Dilute Cu-Mn Alloys.** A. J. Dekker. *Physica,* v. 24, Aug. 1958, p. 697-706.

On the basis of a simple model, the following features of the susceptibility of dilute Cu-Mn alloys are discussed: the concentration dependence of the effective Curie temperature in the high-temperature region; the occurrence of a "gradual" antiferromagnetic transition at low temperatures; the concentration dependence of the position and shape of the antiferromagnetic transition. 5 ref. (P16; Cu, *Mn*)

600-P. (Czech.) **Zinc Telluride as a Semiconductor.** Horak Jaromir, Machovec Mojmir and Kosek Frantisek. *Ceskoslovensky Casopis pro Fysiku,* v. 7, no. 4, 1957, p. 361-368.

ZnTe was synthesized in pure nitrogen at 800° C. Conductivity was measured in a temperature range from 0 to 140° C. using a thin Cu-Zn Te-Cu layer. No photoeffect was observed in ZnTe. Thermal emf. was measured with a Cu-ZnTe contact.
(P15g; Zn, *Te,* 14-68)

601-P. (Korean.) **Thermoelectric Emission in the Process of Melting of Metals.** Mak Zo Ik. *Kvazhak ka Kisul',* no. 7, 1955, p. 38-41.

Connection between thermo-electric emission and work function, relationship of work function to crystallographic directions, relationships of thermo-electric emission and work function to temperature. Research into change in thermo-electric emission during melting of metals. (P15k, P12)

602-P. (Polish.) **Effect of Cathodic Hydrogen on the Magnetic Properties of Chromium-Nickel Austenitic Steel.** L. Kozlowski. *Bulletin de l'Académie Polonaise des Sciences, Troisieme Classe,* no. 5, 1957, p. 519-522.

Variation of the magnetic saturation of austenitic steel as a function of time of cathodic polarization. Restoration of magnetic properties and determination of thickness of surface layer encompassed in the variation of magnetic saturation. Results confirm the conclusion that cathodic hydrogen occurs in austenitic steel only in a thin surface layer of several microns.
(P16; SS)

603-P.* (Russian.) **Theory of Absorption Spectra in Solids.** V. A. Trapeznikov. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 8-16.

X-ray absorption spectra in solids, in accordance with the theory proposed by A. I. Kostarev, are conditioned by dispersed electronic waves emitted by nearest surrounding atoms. This phenomenon depends on coordinating force, radius of coordinating atomic shell and on the nature of surrounding atoms. Heat oscillated atoms influence thin layers of atoms in the region of absorption. 13 ref. (P17, M25)

604-P. (Russian.) **Some Features of the Change of Galvanometric Properties in Relation to the Composition of Alloys.** N. V. Grum-Grzhimailo. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1361-1367.

On curves of the relationship of Goldhammer effect composition of Co-Ni, Fe-Co, Fe-Ni, Fe-Co-Ni and Fe-Cu-Ni alloys, breaks corresponding to multiple proportions of atomic concentrations are observed. These compositions are taken to correspond with the compositions of chemical compounds present in solid solution. In the system Co-Ni a break in the curve corresponds to the composition $CoNi_3$ but a discontinuous change of the curve corresponds to CoNi. In the system Fe-Co the compounds Fe_4Co_2 and $FeCo_2$ are observed.
(P15, 2-60; Co, Ni)

605-P.* **Magnetic Core Materials.** *Iron Age,* v. 182, Oct. 16, 1958, p. 190-191.

Magnetic materials are the heart of most electrical machinery. They can be divided into two classes, soft and hard. Materials of soft cores are silicon iron, Ni-Fe alloys. Materials of permanent magnets are high-carbon steel; Co, Mo and W alloys; Al-Ni-Co-Fe alloys; Cu-Ni-Co alloys; Ag-Mn-Al alloys; Co-V-Fe iron alloys. Description, special properties, typical applications. (P16, 17-57; SGA-n)

606-P.* Decomposition of Hydrogen Peroxide on Antimony and Bismuth Alloys. P. P. Clopp and G. Parravano. *Journal of Physical Chemistry,* v. 62, Sept. 1958, p. 1055-1059.

Kinetic parameters correlated with changes in the electronic structure of Bi and Sb. 26 ref. (P15, P13c; Sb-b, Bi-b)

607-P.* Interactions of Metals With Their Molten Salts. Pt. 1. The Nickel-Nickel Chloride System. J. W. Johnson, Daniel Cubicciotti and C. M. Kelley. *Journal of Physical Chemistry,* v. 62, Sept. 1958, p. 1107-1109.

Nickel has appreciable solubility in molten nickel chloride. The depression of the freezing point of nickel chloride (1009.1°) by the dissolved metal was measured and a eutectic point found at 977.5° and 9 mole % Ni. Constitution of the solution discussed in the light of the freezing point depression. 7 ref. (P12n, P12s; Ni)

608-P.* Structural Peculiarities of Liquid Alloys in Certain Binary Systems. D. K. Belashchenko. *Academy of Sciences of the USSR, Proceedings,* v. 115, 1957, p. 665-668. (Translation by Consultants Bureau, Inc.)

Viscosity and electrical resistance of Sb-Sn, Cd-Sb, Cd-Cu, Pb-Ti, Bi-Ti and Fe-Ni liquid alloys. (P10f, P15g; Sb, Sn, Cd, Cu, Pb, Tl, Bi, Fe, Ni, 14-60)

609-P.* Determination of the Iron Vapor Pressure Over Austenite. E. Z Vintaikin. *Academy of Sciences of the USSR, Proceedings,* v. 115, 1957, p. 723-725. (Translation by Consultants Bureau, Inc.)

Vapor pressure found to vary inversely with temperature. Varies from straightline curve over austenite, but not over pure iron. 6 ref. (P12c; Fe)

610-P.* Transformation in Ternary Solid Solutions Based on Ni_3Fe. M. P. Ravdel and Ya. P. Selissky. *Academy of Sciences of the USSR, Proceedings,* v. 115, 1957, p. 733-735. (Translation by Consultants Bureau, Inc.)

Change in various physical and magnetic properties as Cu, Cr, Mo, Mn, Si, W, V are added in small amounts to Ni_3Fe alloy. 5 ref. (P-general, M24c; Ni, Fe, *Cu, Cr, Mo, Mn, Si, W, V*)

611-P.* (English.) Radiation Effects in Solids. R. Smoluchowski. *Nuovo Cimento, Supplemento,* v. 7, no. 2, 1958, p. 523-543.

7 ref. (P-general, Q-general; 2-67)

612-P.* (French.) Thin Ferromagnetic Films. Hall Effect in Thin Films of Nickel. G. Goureaux, P. Huet and A. Colombani. *Comptes Rendus,* v. 247, July 16, 1958, p. 189-193.

Principal experimental results concerning Hall effect in thin films of Ni measured at ambient temperature in magnetic field varying from 10 to 35,000 Oersteds located perpendicular to plane of film. Longitudinal feed current is alternate, with frequency of 50 to 2000 Hz. For thicknesses studied, Hall effect is not modified by frequency variations in this range. (P15, P16; Ni, 14-62)

613-P. Superconducting Transition in Aluminum. John F. Cochran and D. E. Mapother. *Physical Review,* v. 111, July 1, 1958, p. 132-142.

(P15g; Al)

614-P. Reflection of Slow Electrons From the Surface of Pure Tungsten and From Tungsten Covered With Thin Films. Pt. 2. D. A. Gordetskii. *Soviet Physics-JETP,* v. 34(7), July 1958, p. 4-9.

Reflection of slow electrons from monocrystalline W and from W crystals on which a layer of W has been deposited by evaporation, under conditions of ultra-high vacuum to insure a clean surface. Anomalous changes occur in the reflection coefficients when thin layers of Ba, BaO and Ba-O are applied to a W single crystal; possible explanation. 20 ref. (P15k, P17a; 14-61, W, Ba)

615-P.* Effects of Cold Work and Quenching on the Magnetic Susceptibility of a Commercial Titanium Alloy. Y. L. Yao. *American Society for Metals, Transactions,* v. 51, Preprint no. 114, 1958, 9 p.

The mean susceptibility of Ti-140A measured at room temperature increases with cold work and quenching. While the annealing of most cold worked and all quenched samples at 300° C. for 4 hr. almost wipes out this increase, the identical annealing of lightly deformed samples may cause a further increase. The anomalous effects of low-temperature annealing may be connected to strain aging. Tentative explanations as to what causes the change of the mean susceptibility have been made and some applications are given. 13 ref. (P16, 2-64, 3-68; Ti-b)

616-P.* (German.) **Viscosity of Cast Iron.** Anton Koniger. *Giesserei*, v. 45, Sept. 11, 1958, p. 549-556.

Describes a viscosimeter, the main part of which is a rotating disk for immersion in the liquid iron. Resistance against rotation exerted by the iron is measured electrically. Fluidity of cast iron increases with the phosphorus content while tensile strength is decreased. (P10f, 1-53, E25p; CI)

617-P. Thermoelectric Power of Dilute Indium-Lead and Indium-Thallium Alloys. W. J. Tomasch and J. R. Reitz. *Physical Review*, v. 111, Aug. 1, 1958, p. 757-764.

(P15; In, Pb, Tl)

618-P. Design Properties of Sinterings. Pt. 1. Nonferrous Alloys. *Precision Metal Molding*, v. 16, Oct. 1958, p. 54-56.

Typical properties of sinterings for design use-density, ultimate tensile strength, elongation, Rockwell hardness—for some 60 Cu-base alloys. (P10a, Q27a, Q29n; Cu-b, 6-72)

619-P. Reactivity of Certain Uranium Oxides With Aluminum. Terminal Report. A. L. Eiss. Sylvania-Corning Nuclear Corp. *U. S. Atomic Energy Commission, SCNC-257*, Feb. 10, 1958, 26 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.75.

The reaction of uranium dioxide with Al studied at 450, 500 and 600° C. In most cases reaction at 600° C. occurred within a few hours, whereas reactions at 500° were hardly observed before a time period of several days. The method of manufacturing UO_2 has a pronounced effect on its reactivity. (P13b; P, Al)

620-P.* (French.) **Energy Spectra of the Secondary Electrons Emitted by a Metal Under the Action of a Beam of High-Speed Ions.** F. Pradal and R. Simon. *Comptes Rendus*, v. 247, July 28, 1958, p. 438-441.

Spectra were analyzed in an electron microscope with the help of a magnetic spectrograph. It is possible to assign to each metal a characteristic temperature of emission. 5 ref. (P15k)

621-P. (Russian.) **Electrical Conductivity of Aluminum.** A. P. Relyaev and R. M. Gol'shtein. *Tsvetnye Metally*, no. 5, 1957, p. 74-78.

Electrical conductivity of Al is influenced by a number of factors such as the degree of deformation and heat treatment conditions, but the decisive factor is the impurity content of the metal. Effect of Fe, Si, Cu, Ti, V and Cr on electrical conductivity of high-purity Al, and also on mechanical properties of Al wire. Electrolytically refined Al, containing 0.0017% Fe, 0.0025% Si and 0.002% Cu, has a specific electrical conductivity at +20° of 38 m/ohm. per sq. mm., which is 57% of that of Cu. (P15g; Al)

622-P. (Russian.) **Effect of Composition of Aluminum-Zinc Alloys on the Magnitude of the Dimensional Changes in Specimens Due to Cyclic Heat Treatment.** A. A. Bochvar and P. K. Novik. *Doklady Akademii Nauk*, v. 112, no. 6, 1957, p. 1041-1042.

Pure Al, pure Zn and Al-Zn alloys were studied. The length of pure Al and Zn specimens increased as a result of cyclic heat treatment in the range 13-340° C., whereas the alloys containing 75-90% Zn decreased in length. A hypothesis is advanced relating to the mechanism of plastic deformation due to cyclic heat treatment and a curve shows the change in length after 60 cycles, as a function of alloy composition. (P10d, 2-64; Al, Zn)

623-P. (Russian.) **Magnet Type Alloys With a Decreased Cobalt Content.** L. M. Germash, A. M. Morogova and M. S. Yanskaya. *Metallovedenie i Obrabotka Metallov*, no. 6, 1957, p. 8-10.

Possibility of decreasing Co content in magnet-type alloy while retaining maximum magnetic energy, remanence and coercive force. A lowering in Co content from 24 to 21% has no substantial bearing on the optimum cooling velocity and does not require the application of

greater magnetic poles in the thermomagnetic treatment.
(P16, 2-60; SGA-n)

624-P. Research on Aluminum Antimonide for Semiconductor Devices. A. Herczog, R. R. Haberecht and A. E. Middleton. P. R. Mallory & Co. (Wright Air Development Center.) *U. S. Office of Technical Services*, PB 131849, Mar. 1958, 39 p. $1.

Purification and crystal growing techniques for obtaining suitable aluminum antimonide material. Chemical, physical and electrical characteristics of these crystals, techniques for making ohmic contacts and p-n junctions and feasibility of devices such as rectifiers and transistors for operation at 500° C. Difficulties encountered with carbon impurities and ineffectiveness of zone refining techniques to alleviate this problem. From the available material, point contact and grown junction diodes were made which showed rectification up to 200-250° C.
(P15g; Al, 14-68, SGA-r)

625-P.* Anodic Behavior of Nickel. Pt. 1. Effect of Components of Electrolyte. Nelson F. Murphy and Bharat C. Oza. *Virginia Polytechnic Institute, Bulletin*, v. 51, May 1958, 18 p.

Quantitative effects of constituents of electrolyte on the behavior of three Ni anodes. The anode potential and current density at which Ni became passive was found to be a reproducible value that increased as temperature increased. Effect of fluoride ion in destroying passivity of Ni studied quantitatively. The limiting current density was increased by presence of sulphate ion, the magnitude of the increase depending on the concentration of Ni in the solution. Boric acid did not affect limiting current density at low concentration of Ni ion but had appreciable effect at higher Ni concentrations. 13 ref. (P15; Ni)

626-P.* Role of Adsorption in Production and Measurement of High Vacuum. Chikara Hayshi. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 13-26.

Expressions describing effects of adsorption on gas flow in high vacuum on leak detection, on vacuum measurement and on behavior of water vapor and oil vapor in high-vacuum apparatus.
(P13, X-general, 1-73)

627-P.* Utilization of the Surface Tension of Liquid Metals in Making High-Vacuum Seals. Norman Milleron. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 38-41.

Eutectic alloy of Ga, In and Sn molten at room temperature with surface tension of 500 dyn per cm., vapor pressure of 10^{-8} mm. Hg at 500° C. and excellent wetting properties. Alloy can be utilized in valves, motion seals and flanged joints. Using ultrasonic technique, alloy readily wets W, Mo, Ta, SS, Pyrex, quartz and certain ceramics. 5 ref. (P12c, P13h, T7, 1-73; Ga, In, Sb, 14-60)

628-P.* Resistance-Temperature Characteristics of Evaporated Chromium Films. Dorothy M. Hoffman and Jacob Riseman. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 42-46.

Resistance-temperature characteristics of evaporated Cr films studied as a function of thickness. Resistivity ranged from 25 to 100 microhms per cm. corresponding to thickness from 1700 down to 70 Å for films prepared on substrates held at 25, 70 and 250° C.
(P15g, 2-61; Cr, 14-62)

629-P.* The Element Columbium and Its Compounds. James R. Darnell and L. F. Yntema. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, N. Y., 1958, p. 1-9.

Physical and chemical properties of Cb and characteristics of its binary compounds with C, B, Si, N and S. Temperatures of fusion and vaporization of columbium pentahalides. Formation and properties of pentoxide and other columbium oxides. Thermodynamic properties of Cb and Cb compounds at 25° C. 69 ref. (P12, P13; Cb, 14-68)

630-P.* (German.) Sandwich Method in Construction of Airplanes and in Other Industries. Pt. 2. B. R. Noton. *Aluminium*, v. 34, Sept. 1958, p. 522-529.

Thermal conductivity, density, specific strength for glass, cotton, paper, balsa wood, Al and stainless steel. Formulas for computing mechanical properties. Testing methods and instruments. (To be continued.) 6 ref. (P11g, P10a, Q-general, 1-53, 1-54; 7-59; Al, SS)

631-P.* (Japanese.) Electronic Cooling and Heating by Semiconductors.

N. Makino and H. Shidara. *Metals*, v. 28, Oct. 1958, p. 785-788.

Semiconductors are classified as metallic crystals, valence bond crystals, ionic bond crystals and organic molecular bond crystals. Energy levels of crystals have, in general, band structure and show intrinsic conductivity. However, if there are impurity levels, the crystal has more conductivity and behaves as donor or acceptor. Semiconductors are used as resistors, thermisters, varisters, photoconductors, photocells and rectifiers.
(P15g, T1, 17-57; EG-j)

632-P. (Russian.) **Inherently Magnetically Soft Alloys for Impulse Technique and High-Frequency Telephony.** V. Ya. Skotnikov and K. D. Maryanova. *Sbornik Trudov (Tsentralny Nauchno-Issledovatelskii Institut Chernoj Metallurgii Institut Stali)*, v. 15, 1956, p. 397-424.

A series of alloys, based on a 50-40% Fe-Ni alloy, has been developed, with a high electrical resistance, increased impulse permeability and low magnetic after effect, in the form of strip up to 0.02 mm. thick. Properties of the alloys, production technology, heat treatment and methods of electrical insulation between coils.
(P16, X15r, 17-57; Fe, Ni)

633-P. An Electrochemical Method for Determination of Saturation Pressure and Heat of Solution of Hydrogen in a Two-Phase Pd-H Alloy. Robert J. Ratchford and Gilbert W. Castellan. *Journal of Physical Chemistry*, v. 62, Sept. 1958, p. 1123-1127.

20 ref. (P12; Pd, *H*)

634-P. Carrying the Ball for Titanium. *Modern Metals*, v. 14, Oct. 1958, p. 66, 68, 69.

Characteristics of four new Ti alloys with great possibility in industrial application.
(P-general, Q-general, T24, 17-57; Ti)

635-P. Uranium. Pt. 3. Uranium Alloys and Dispersions. R. A. Noland, J. F. Schumar and J. H. Kittel. *Nucleonics*, v. 16, Aug. 1958, p. 89.

Dimensional changes of pure U, U-Cr, U-Mo, U-Pu, U-Zr, Th-U alloys and U_3Si under irradiation. 6 ref. (P10d, 2-67; U, Zr, Cr, Mo, Pu)

636-P. Surface Tension of Aluminum and Its Alloys. A. M. Korol'kov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, Feb. 1956, p. 35-42. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-46K21R.)

Previously abstracted from original. See item 252-P, 1956.
(P13h; Al)

637-P. (Dutch.) **Permanent Magnetic Properties of Some New Materials.** K. Tendeloo. *Metalen*, v. 13, Aug. 15, 1958, p. 268-272.

(P16, X11g; SGA-n)

638-P. Comparison of Calculated and Experimental Values for the Optical Reflectivity of the Liquid Alloys Hg-In, Hg-Tl, Ga-In at 25° C. L. G. Schulz. Institute for the Study of Metals. *U. S. Office of Technical Services*, PB 125900, Nov. 1956, 15 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

(P17a; Hg, In, Tl, Ga, 14-60)

639-P. Electrochemical Behavior of Tin (Electrochemistry). Ugo Bertocci and Giovanni Serravalle. Politecnico di Milano. *U. S. Office of Technical Services*, PB 125980, Apr. 1956, 40 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3; Photostats $6.30.)

(P15; Sn)

640-P. Temperature Variation of Intensity of Magnetization in Thin Nickel Films. A. M. Eich. Case Institute of Technology. *U. S. Office of Technical Services*, PB 126921, June 1956, 29 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Manner in which the intensity of magnetization of thin Ni film varies with temperature and film thickness studied with a magnetization hysteresis loop tracer. Films of thickness 35 to 1350 Å studied from approximately 10° K. to room temperature. (P16; Ni, 14-62)

641-P. Polarization Characteristics of Metals in Some Automotive Coolant Materials. M. Levy. Aberdeen Proving Ground. *U. S. Office of Technical Services*, PB 130193, Jan. 1957, 47 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Anodic and cathodic polarization measurements were made of steel-copper couples in tap water and 30% ethylene glycol environments treated with various inhibitor materials. (P15, R10b; ST, Cu)

642-P. Research in Electrical Properties of Intermetallic Compounds. Tien-Shih Liu and Renato Bobone. Horizons Inc. *U. S. Office of Technical Services,* PB 130839, July 1954, 50 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Preparation and electrical measurements of Ni-Al alloys and Ni-Al-Cu alloys in the cubic B region. Measurements show that the locus of minima of the resistivity for the Ni-Al-Cu ternaries is to be found within a strip containing the transition line from non-defect to defect structures. A qualitative explanation of the main features in the electrical behavior of the alloys, based on the Brillouin zone theory. (P15, M24c; Ni, Al, Cu, 14-68)

643-P. Partition of Soluble Carbon in Ti-6Al-4V Alloy. Richard D. Siebel, Richard L. Beck and Leonard E. Olds. Denver University Research Institute. *U. S. Office of Technical Services,* PB 131603, Nov. 1957, 78 p. $2.

Possible means for determining microdistribution of interstitial-type solutes such as nitrogen, oxygen and carbon, particularly in the more complex alloys. A useful method was developed for measuring microdistribution of solutes in alloys. (P12e; C, Ti, *Al, V*)

644-P. Effect of Temperature on the Magnetic Properties of Nickel-Iron Alloys. J. J. Clark and J. F. Fritz. Westinghouse Electric Corp. *U. S. Office of Technical Services,* PB 131799, Dec. 1957, 37 p. $1.

Normal magnetization curves for various temperatures between −60 and +250° C. are presented for six Ni-Fe alloys, together with curves illustrating behavior of saturation induction, remanence and coercivity over this temperature range. A dependence of d-c magnetic properties of Hipernik V and Deltamax alloys on temperature cycling is also reported. (P16, 2-61; Ni, Fe)

645-P.* A Study of the Interface Impedance Characteristics of Seven Commercial Cathode Nickel Alloys. C. D. Richard, Jr., and A. M. Bounds. *Electrochemical Society,* Abstract no. 82, May 1957, p. 192-194.

Alloys chosen were Inco 225, a high-Si active alloy; Inco 220, a low-Si, low-Mg alloy; Inco 330, a low-Si alloy with high Mg; Cathaloy A-30, an Al-Ni alloy; Cathaloy A-31, a W-Ni alloy; Cathaloy A-32, an Al-W-Ni alloy; and Cathaloy P-50, a pure Ni. (P15; Ni-b)

646-P.* (German.) Influence of Annealing Gases on Magnetic Properties of Ferrites. Carl Heck and Joachim Weber. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 495-504.

On a number of technically important Mn-Zn ferrites the influence of mixing rate, flux, annealing temperature and oxygen contents of annealing gases upon permeability and shape of hysteresis loop is investigated. It was found that annealing in air over too long periods is harmful. 21 ref. (P16, J23; Fe, *Mn, Zn,* SGA-n)

647-P.* (German.) Magnetic Properties of Thin Layers. H. Mayer. *Metalloberfläche,* v. 12, Sept. 1958, p. 257-262.

Study of thin ferromagnetic layers, orientation of magnetic particles, hysteresis loop, magnetic saturation, decrease of the Curie-temperature, increase of coercive force. Facts that can be important in the theory of magnetism as well as in the use of the above layers in electronic computers. 34 ref. (P16; SGA-n)

648-P.* (German.) Soft Magnetic Materials Based on Iron-Silicon-Aluminum Alloys. Gunther Rassmann, Erich Linder and Roland Wittig. *Neue Hütte,* v. 3, June 1958, p. 365-373.

Investigations on the unusual curves of permeability as a function of temperature in Fe-Si-Al alloys resulted in a relationship between composition of material and permeability. The same was found on metal powders, which can be used for magnetic cores of positive, negative or zero temperature coefficient. Sintered parts lend themselves well to applications where formerly only cast material could be used. 8 ref. (P16, 2-61; Fe, Si, Al, SGA-n)

649-P. Properties of Ternary Alloys of Titanium, Chromium, and Zirconium Diborides. K. I. Portnoi and G. V. Samsonov. *Academy of Sciences of the USSR, Proceedings,* v. 116, no. 1-6, 1957, p. 953-955. (Translation by Consultants Bureau, Inc.)

The solubility of ZrB_2 in (Ti, Cr)B_2 is about 40 mole %, and that of (Ti, Cr)B_2 in ZrB_2 is less than 10 mole %. The range of solubility of ZrB_2 in CrB_2 increases on dissolving ZrB_2 in the double borides (Ti, Cr)B_2, with one of the components of which (TiB_2) the zirconium boride forms a continuous series of solid solutions. In the single-

phase region of a solid solution of ZrB_2 in (Ti, Cr)B_2 in samples quenched from 1900°, there is a maximum in the microhardness of 3900 kg. per sq. mm. (at 20 mole % ZrB_2) and in the electrical resistance. 6 ref. (P12e; T, Cr, Zr, 14-68)

650-P.* Optical Properties of Chromium. Robert M. Hill and Charles Weaver. *Faraday Society, Transactions,* v. 54, Aug. 1958, p. 1140-1146.

Refractive index of bulk Cr was measured as 1.18-11.06 for light of wave length 5461 Å. Surface film on a polished bulk metal specimen has a refractive index of 2.42 and a thickness of 50 Å. 13 ref. (P17; Cr)

651-P.* Some Magnetic Properties of Dilute Ferromagnetic Alloys. Pt. 2. B. W. Lothian, A. C. Robinson and W. Sucksmith. *Philosophical Magazine,* v. 3, Sept. 1958, p. 999-1012.

Investigation of Cu-Fe, Cu-Co and Au-Ni alloys. Various magnetic properties; effect of temperature, heat treatment, cold working. 8 ref. (P16; Co, Cu. Fe, Au, Ni)

652-P.* Magnetic Susceptibility of Copper-Nickel and Silver-Palladium Alloys at Low Temperatures. E. W. Pugh and F. M. Ryan. *Physical Review,* v. 111, Aug. 15, 1958, p. 1038-1042.

Susceptibility in range 2.1° to 295° K. is nearly independent of temperature for Ag-Pd alloys, and for Cu-Ni alloys containing up to 27% Ni. (P16q, 2-73; Ag, Cu, Ni, Pd)

653-P.* Variation of Hall Coefficient of Some Non-Ferromagnetic Superlattice Alloys. Kiyoshi Yonemitsu and Takao Sato. *Physical Society of Japan, Journal,* v. 13, Sept. 1958, p. 998-1004.

The temperature dependence of Hall coefficient of five superlattice alloys of Cu_3Pd, CuZn, Ni_3Cr, Au_3Cu and Ag_3Mg was measured to find the effect of order-disorder transformation upon it. 11 ref. (P15p, 1-61, N10; Cu, Pd, Zn, Au, Ag, Ni, Cr, Mg)

654-P. "Pin-Cushion" Irradiation Tests of Uranium and Its Zirconium Alloys. S. H. Paine and F. L. Brown. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5538,* July 1958, 41 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

In an irradiation test of U^{235} and U^{235}-Zr specimens in the range 2 to 20% Zr, small pins were mounted in heat transfer blocks, or "cushions", so that surface roughening and length changes could be observed, recorded and compared for five stabilizing heat treatments up to exposure levels of approximately 1% total atom burnup. (P10d, Q-general, 2-64, 2-67; U-b, *Zr*)

655-P. Effect of Burnup of Metallic Fuel Elements Operating at Elevated Temperatures. B. R. Hayward and G. G. Bentle. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/617, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Materials studied were unalloyed uranium; uranium with ~2.0% Zr; with 1.5% Mo; and 3.0% Mo; and Th with 7.6% U. All these fuels are being monitored during irradiation in the Sodium Graphite Reactor Experiment (SRE). 12 ref. (P10d, Q-general, 2-62, 2-67; U, Th)

656-P. Mechanism of Irradiation-Induced Dimensional Instability of Uranium. L. L. Seigle and L. S. Castleman. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/618, 1958, 10 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Effect of grain size on growth rate; computation of growth rates; effect of temperature; comparison of diffusional and stress relaxation mechanisms. 21 ref. (P10d, 2-67; U)

657-P. Advances in the Physical Metallurgy of Uranium and Its Alloys. H. H. Chiswik, A. E. Dwight, L. T. Lloyd, M. V. Nevitt and S. T. Zegler. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/713, 1958, 35 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Primary impetus placed on the improvement of two essential properties in the utilization of uranium as a fuel-element material—dimensional stability and corrosion resistance. Heat treatment, transformation kinetics and micrographic features of high uranium-base systems which have shown promise in this direction. 47 ref. (P10d, R-general, 2-64, 3-71, T11g, 17-57; U)

658-P. Effect of Irradiation on Fuel Material. J. H. Kittel and S. H. Paine. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1890, 1958, 20 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Although unalloyed U with suitable metallurgical treatment can be subjected to burnups on the order of 2 at.%, damage is severe. The deleterious changes which occur at moderate irradiation temperatures are principally because of surface roughening and anisotropic growth. Certain alloying additions greatly refine the grain size in U, thus eliminating surface roughening. 12 ref. (P10d, M27c, 2-67; U)

659-P.* (Russian.) **Electrical Resistance of Iron, Nickel and Nickel-Copper Alloys at Low Temperatures.** E. I. Kondorsky, O. S. Galkina and L. A. Chernikova. *Zhurnal Eksperimental'noj i Teoreticheskoj Fiziki,* v. 34, May 1958, p. 1070-1076.

Measurements were made in the temperature range 2-78° K. It is believed that the resistance of ferromagnetic metals at low temperatures is related to scattering of electrons or inhomogeneities of the magnetic moment of the lattice.
(P15g, 2-63; Fe, Ni, *Cu*)

660-P.* (Russian.) **Thermal Properties of Superconductors. Pt. 2.** N. V. Zavaritsky. *Zhurnal Eksperimental'noj i Teoreticheskoj Fiziki,* v. 34, May 1958, p. 1116-1124.

Specific heat, thermal and temperature conductivity of Al and Zn measured between 1.5 and 0.15° K. by the temperature wave method. Results compared with measurement of specific heat of other superconductors and with results of microscopic theory of superconductivity. 22 ref. (P11, P12r; Al, Zn)

661-P.* (Russian.) **Surface Resistance of Superconducting Cadmium.** M. S. Khaikin. *Zhurnal Eksperimental'noj i Teoreticheskoj Fiziki,* v. 34, June 1958, p. 1389-1397.

Apparatus which can be used to measure the surface resistance of a metal at a wave length of 3.2 cm. in the super-low-temperature region of about 0.1° K. Total surface resistance of a Cd single crystal is measured in the temperature interval between 0.1 and 0.6° K. Results are analyzed and penetration depth of electromagnetic field in superconducting Cd determined. 17 ref. (P15g; Cd)

662-P.* (Russian.) **Anodic Activation of Chromium and Chromium Steels.** E. I. Antonovskaya and A. M. Sukhotin. *Zhurnal Fizicheskoi Khimii,* v. 32, Aug. 1958, p. 1842-1845.

Anodic potential of Cr diminishes when the pH number of electrolyte increases. Over the range of high anodic potentials, the ratio of Cr and Fe in solution is different from the ratio of these elements as constituents of the steel. Ratio of elements in solution given for steels 1Kh13 and 1Kh25 at different anodic potentials. 5 ref. (P15; AY, *Cr*)

663-P.* (Russian.) **In What Form Is Silicon Present in Liquid Iron?** A. A. Vertman and A. M. Samarin. *Doklady Akademii Nauk SSSR,* v. 120, no. 2, 1958, p. 309-310.

The magnetic susceptibility of melts of the system Fe-Si was measured for 0 to 60% Si and reached a minimum with an assumed content of 34% FeSi. Magnetic susceptibility thought to decrease with increased amount of Si compounds, and to increase with increased amount of free Si atoms present. 11 ref.
(P16; Fe, *Si,* 14-60)

664-P.* (Russian.) **Spin-Lattice Relaxation and Nuclear Magnetic Resonance of Rare Earth Salts.** K. A. Valiev. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 193-202.

Possibility of experimental study of nuclear magnetic resonance of nuclei or paramagnetic ions of rare earth compounds. Experiments conducted at 1.2° K. with Si specimens containing additions of paramagnetic P atoms. Experimental observation of magnetic resonance depends mainly on width of absorption line. In magneto-diluted crystals of rare earth salt ions, the width of the line is determined by the spin-lattice interaction of the ions. 11 ref. (P16f, M26r; EG-g, P, Si)

665-P.* (Russian.) **Electric Conductivity of Ferromagnetic Metals at Low Temperatures. Pt. 2.** E. A. Turov. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 203-213.

Phenomenological observations of interaction of electron conductivity and ferromagnets. Detailed study of electrical resistivity at low temperatures; new experimental data. Solution of corresponding kinetic equation by means of its reduction to equation of diffusion of phase states on Fermi surfaces in area of quasi-impulses. Investigation of ad-

ditional electrical resistivity in ferromagnetic metals related to the diffusion of electrons in ferromagnets. 18 ref. (P15g, N1c, 2-63; SGA-n)

666-P.* (Russian.) **Electric Conductivity of Antiferromagnetic Metals.** Yu. P. Irkhin. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 214-221.

Influence of antiferromagnetic ordering on electric conductivity, analogous to the theory of binary ordered alloys. Main results are contingent on the possibility of splitting the conductance bands by two subbands divided by split energy intervals. Actual experimental data confirm qualitatively the theoretical assumptions. The peculiarities of electroconductivity in antiferromagnetic ordering are also to be observed in semiconductors. 22 ref. (P15g, P16p)

667-P.* (Russian.) **Magnetic Grain Structure in Magnetic Poles of Thin Iron Surfaces Obtained by Electrolysis.** N. V. Kotel'nkov. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 222-228.

The internal stress of ferromagnetic deposits obtained by electrolysis can alter the grain structure. The grain structure of deposited metal is influenced by lining material, machining of the lining surface before deposition, structure of the deposited metal and the magnetic pole. In its effect on grain structure there is a maximum polarity (a critical point). If it is exceeded the grain structure declines. Coating of the magnetic pole in process of deposition on iron improves quality of coating and strengthens its adhesion to the lining (undercoating). 9 ref.
(P16, 3-68; Fe, SGA-n)

668-P.* (Russian.) **Magnetic Properties of Magneto-Anisotropic Objects of Ferromagnetic Powder. Pt. 3.** G. S. Kandaurova, Ya. S. Shur and E. V. Shtol'ts. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 229-236.

Study of anisotropy of magnetized curves and hysteresis of lattice structure in objects of magnetic grain structure. Objects were in form of disks made from Co powder and Mn-Bi. Results showed characteristics of magnetic structures of tiny particles of Co and Mn-Bi alloys (size 1-100 μ). 8 ref. (P16, M26, 3-72; Bi, Co, Mn, SGA-n, 6-68)

669-P.* (Russian.) **Study of Iron-Nickel and Iron-Cobalt Alloys With Frequency Band of 10^5 to 10^7 Cycles.** E. I. Kondarskii and L. G. Smirnova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 237-246.

Aim was to overcome lack of systematic data on penetrability of magnetic sheet steel. Materials investigated with varying values of constant anisotropy and magnetostriction: Mo-permaloy, Armco iron, and Fe-Co alloys (containing 20, 36, 60 and 72% Co). 10 ref.
(P16q, P16b, 3-72; ST, Co, Fe-B, Mo, Ni, SGA-n, 4-53)

670-P.* (Russian.) **Influence of Decomposition of Super-Saturated Hard Metals on the Hall Effect.** A. V. Cheremushkina. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 268-271.

Influence of diffusion hardening on Hall effect, specific electric resistivity, magnetized saturation and coefficient of force of Fe-W alloys (3.7 to 17.3% W). Conclusions confirm earlier investigations showing existence of a critical concentration as to optimum possible solubility of W in Fe. Exceeding that limit produces no changes in electric resistivity. 7 ref.
(P15p, P15g, P16, 2-60, 2-64; Fe, W)

671-P.* (Russian.) **Influence of Nonuniformity in Steel on Electrical Resistivity During Phase Changes.** N. M. Rodizin. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 315-320.

Heating by an electric current directly without intermediate means makes it possible to heat object with great speed resulting in many practical advantages. It is reflected in the phase changes and in its basic characteristics. It results in an uneven distribution of heat to the various microparticles having varying electrical resistivity. Distribution of heat energy by electric heating of steel depends on form and distribution of microparticles and different electrical resistance.
(P15g, N8, 2-61; ST)

672-P. Magnetic Properties of Stainless Steels. W. S. Eberly. *Electrical Manufacturing,* v. 62, Sept. 1958, p. 91-94, 302, 303.

Normal fabricating processes and minor variations in chemical composition can cause normally nonmagnetic (austenitic) steels to become magnetic or, conversely, can depreciate the magnetic qualities of ferritic and martensitic alloys.
(P16; SS)

673-P. Single Crystal Iron Whiskers Adapted to the Basic Study of Magnetic Domains. Gifford G. Scott and Robert V. Coleman. *Engineering Journal,* v. 5, July-Aug-Sept. 1958, p. 34-37.

6 ref. (P16c; Fe, 14-61)

674-P. Effect of Alloying on the Critical Mass of a Plutonium Spherical Fast Reactor. James T. Weber, Mary Repar Kline and Leah K. Johnson. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 341-353.

Effect of alloying on the amount of Pu required to form a critical mass of each alloy has been expressed in terms of an inventory requirement ratio. This quantity was obtained for 27 potential alloying elements at three compositional levels. 7 ref. (P18, 2-60, T11g; Pu-b)

675-P. Intrinsic Optical Absorption in Single-Crystal Silicon Carbide. Hekrert R. Philipp. *Physical Review,* v. 111, July 15, 1958, p. 440-441.

(P17c; Si, *C,* 14-61)

676-P. Electrical Properties of Mercury Telluride. R. O. Carlson. *Physical Review,* v. 111, July 15, 1958, p. 476-478.

Measurements of resistivity and Hall effect extended to liquid hydrogen temperature reveal a marked magneto-Hall effect. The Hall coefficient changes sign at temperatures as low as 20° K. Some measurements of thermo-electric power and thermal conductivity are also given. (P15g; Hg, Te, 14-68)

677-P. Influence of Electron Interactions on Metallic Properties. John G. Fletcher and David C. Larson. *Physical Review,* v. 111, July 15, 1958, p. 455-462.

Influence on one-electron energy in metals calculated. (P15)

678-P. Variation With Frequency of the Resistance of Superconducting Tin and Indium. M. D. Sturge. *Royal Society, Proceedings,* v. 246, Aug. 26, 1958, p. 570-581.

22 ref. (P15g; In, Sn)

679-P. Physics of Natural Uranium Lattices in Heavy Water. G. Dessauer. Second United Nations Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/590, 1958, 43 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Physics parameters of more than 250 different lattices were measured. Amount of U at each lattice point in the lattice spacing and the amount and distribution of coolant within each fuel assembly varied over a wide range. 31 ref. (P18, T11g; U)

680-P. Resonance Capture in Uranium and Thorium Lumps. B. I. Spinrad, J. Chernick and N. Corngold. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1847, 1958, 38 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

From logical inference and detailed sample calculations a form for representation of effective resonance integrals is presented. Qualitative formulations are also derived whereby resonance integrals can be computed on a line-by-line basis for mixtures, clusters and lumps. 25 ref. (P18m; U, Th)

681-P. Thermomagnetic Nernst Effect in Iron-Nickel Alloys. E. P. Svirina and R. P. Ivanova. *Fizika Metallov i Metallovedenie,* v. 3, no. 3, 1956, p. 444-448. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4250.)

(P15; Fe, Ni)

682-P. Enthalpy of Formation of Strontium Arsenide Sr_3As_2. S. M. Ariya, Kan Kho-in, Yu. Barabanel and G. M. Loginov. *Journal of General Chemistry of the USSR,* v. 27, no. 7, 1957, p. 1812-1814. (Translation by Consultants Bureau, Inc.)

5 ref. (P12r; Bi, K, Sb, Sr, As)

683-P. Mechanism of Metal Electrodeposition From Solutions of Simple and Complex Salts. A. I. Levin. *Journal of General Chemistry of the USSR,* v. 27, no. 7, 1957, p. 1815-1820. (Translation by Consultants Bureau, Inc.)

23 ref. (P15, L17, L18, C23, U2j)

684-P. Electron Reactions in Stainless Steels Containing Sigma Phase. I. Bertetti. *Metallurgia Italiana,* no. 7, 1956, p. 324-326. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB153.)

(P15; SS)

685-P. Delayed Electron Emission of Metals. K. Seeger. *Zeitschrift für Physik,* v. 141, 1955, p. 221-236. (Spe-

cial Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-25G8G.)
(P15k)

686-P. Solubility of Thorium in Liquid Zinc. M. V. Smirnov, N. G. Ilyushchenko, S. P. Detkov and L. E. Ivanovskiĭ. *Zhurnal Fizicheskoi Khimii*, v. 31, 1957, p. 1013-1018. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4215.)
Previously abstracted from original. See item 357-P, 1957.
(P12e; Zn, Th)

687-P. (German.) Structural Changes of Gallium Telluride (Ga_2Te_3) Caused by Cu Additions. Gunter Harbeke and Gunter Lautz. *Naturwissenschaften*, v. 45, June 1958, p. 283-284.
Different electric and absorption properties with Cu additions between 8.10^{-6} and 10^{-5} at.%, thought to be caused by structural transformations. (P15, P17; Cu, Ga, Te)

688-P. (Russian.) Theory of Surface Conductivity of Metals. C. V. Vonsovskii and M. C. Cvirskii. *Doklady Akademii Nauk SSSR*, v. 120, no. 2, 1958, p. 269-272.
8 ref. (P15g)

689-P. Kinetics of the Oxidation and Nitridation of Silicon at High Temperatures. J. W. Evans and S. K. Chatterji. *Journal of Physical Chemistry*, v. 62, Sept. 1958, p. 1064-1067.
Kinetic behavior of Si in oxygen and CO_2 in nitrogen and in argon containing a trace of nitrogen at 1200-1400°. 7 ref. (P12, R2; Si, 2-62)

690-P. Calculation of Entropies of Solute Atoms From Solid Solubilities. J. F. Freedman and A. S. Nowick. *Acta Metallurgica*, v. 6, Mar. 1958, p. 176-183.
Intrinsic entropy (excess entropy per solute atom) obtained for Ag, Cu, Si, Pb, Fe and Ni in various metals, and for other solutes which form intermetallic compounds. 28 ref.
(P12s; Ag, Cu, Pb, Si, Fe, Ni, 14-68)

691-P. Anomalous Thermal Expansion of Some Rare Earth Metals. B. S. Chandrasekhar. *Acta Metallurgica*, v. 6, Mar. 1958, p. 212-214.
Anomalies in Gd, Tb and Dy explained. 13 ref. (P11g; EG-g)

692-P. Energetics of CsCl-CsBr Solid Solutions. Vaino Hovi. *Acta Metallurgica*, v. 6, Apr. 1958, p. 254-259.
Heats of formation measured; values of free energy of formation at different compositions and temperatures calculated. 21 ref.
(P12q, P12a; Cs, 14-67)

693-P. Thermodynamics of Phase Diagrams of Binary Systems Involving Compounds. C. Wagner. *Acta Metallurgica*, v. 6, May 1958, p. 309-319.
Formulas are derived to calculate the free energy of formation of a binary compound of virtually invariable composition from the components. 13 ref. (P12a; M24b)

694-P. Thermodynamic Properties of the III-V Compounds InSb, GaSb and InAs. Werner F. Schottky and Michael B. Bever. *Acta Metallurgica*, v. 6, May 1958, p. 320-326.
Free energies of formation, Sb heats of fusion and heats of formation. 21 ref.
(P12q, P12a; In, Ga, Sb, As, 14-68)

695-P. Dilute Solutions in Molten Metals and Alloys. C. B. Alcock and R. D. Richardson. *Acta Metallurgica*, v. 6, June 1958, p. 385-395.
Measurements of activity coefficient of S in Cu, and in binary alloys of Cu with Au, Si, Pt, Co. Fe and Ni at 1100 to 1500° C. 28 ref. (P12h; S, Cu, Au, Si, Pt, Co, Fe, Ni, 2-62)

696-P. Rate of Clustering in Al-Cu Alloys at Low Temperatures. W. Desorbo, H. N. Treaftis and D. Turnbill. *Acta Metallurgica*, v. 6, June 1958, p. 401-413.
Change in resistivity, hardness and other properties of Al-Cu (1-5% Cu) alloys noted at room temperature. Attributed to formation of Cu-rich clusters. Kinetics of clustering investigated. 22 ref. (P-general, Q-general; Al, Cu, 9-69)

697-P. Influence of Plastic Deformation on Expansivity and Elastic Modulus of Aluminum. M. J. Hardon, B. S. Lement and B. L. Averbach. *Acta Metallurgica*, v. 6, June 1958, p. 446-453.
Deformation of polycrystals increases thermal expansion coefficient, decreases elastic modulus, influenced by types of defects in the deformed lattice. 15 ref.
(P11g, Q21a, 3-68; Al)

698-P. Nature of the Interface Between a Solid Metal and Its Melt. J. E. Hilliard and J. W. Cahn. *Acta Metallurgica*, v. 6, Dec. 1958, p. 772-774.

Anomaloy in grain-boundary and solid-liquid interfacial energies for Cu and Ag explained by assuming the interface to be diffused. 8 ref. (P13h, Cu, Ag)

699-P. Heat of Formation of Titanium Tribromide by the Mercury Reduction of Titanium Tetrabromide. Elton H. Hall and John M. Blocher, Jr. *Electrochemical Society, Journal*, v. 105, Jan. 1958, p. 40-44.

7 ref. (P12q; Ti-b, Br, NM-a37)

700-P. Enhanced Surface Reactions. Pt. 2. Oxygen Adsorption on Several Metals. Manfred J. D. Low. *Electrochemical Society, Journal*, v. 105, Feb. 1958, p. 103-105.

Iron, copper, molybdenum, magnesium, aluminum and gold. 9 ref. (P13d, P13b; Fe, Cu, Mo, Mg, Al, Au, O)

701-P. Concentration of Hydrogen in Nickel Under Hydrogen Ion Bombardment. J. Morrison and J. J. Lander. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 145-148.

Measured using Ni diffusion tube as cathode in a glow discharge. 4 ref. (P13d, P13b, 1-66; Ni-b, *H*)

702-P. Mechanisms of Hydrogen-Producing Reactions on Palladium. Pt. 5. Deuterium-Palladium System. Sigmund Schuldiner and James P. Hoare. *Electrochemical Society, Journal*, v. 105, May 1958, p. 278-284.

Anodic and cathodic polarization curves for the alpha Pd-D system determined on a Pd bi-electrode. 8 ref. (P13b, M24b; Pd, D, H)

703-P. Cube Oriented Magnetic Sheet—a Major Advance in Magnetic Materials. G. W. Wiener and Klaus Detert. *Journal of Metals*, v. 10, Aug. 1958, p. 507-508.

Magnetic properties of new cube-oriented Si-Fe transformer sheet developed by Westinghouse Electric Corp. (P16, M26c; Fe-b, *Si*, SGA-n)

704-P. Magnetic Properties of Cube Textured Transformer Sheet. J. L. Walter, W. R. Hibbard, H. C. Fiedler, H. E. Grenable, R. H. Pry and P. G. Frishmann. *Journal of Metals*, v. 10, Aug. 1958, p. 509-511.

Magnetic properties of new cube-oriented Si-Fe transformer sheet developed by General Electric Co. 6 ref. (P16, M26c; Fe-b, *Si*, SGA-n)

705-P. Hall Effect and Resistivity fo Porous Copper. E. Goldin and H. J. Juretschke. *Metallurgical Society of AIME, Transactions*, v. 212, June 1958, p. 357-360.

Temperature variation of resistivity, Hall constant, resistivity of Cu prepared by pressing and sintering of fine Cu powder. 7 ref. (P15g, P15p, 2-61; Cu, 6-71)

706-P. Preparation and Properties of Europium. F. H. Spedding, J. J. Hanak and A. H. Daane. *Metallurgical Society of AIME, Transactions*, v. 212, June 1958, p. 379-383.

Melting and boiling point; lattice constant, density, electrical resistivity and its temperature coefficient, and density at 298° K.; compressibility; change of volume on melting; vapor pressure; temperature of thermal linear expansion. 24 ref. (P-general; Eu)

707-P. Processing and Properties of Cobalt Platinum Permanent Magnet Alloys. D. L. Martin. *Metallurgical Society of AIME, Transactions*, v. 212, Aug. 1958, p. 478-485.

Magnetic properties of alloys influenced by composition and heat treatment. Good ductility and machinability. 10 ref. (P16, G17k, Q23p, M24b, 2-60, 2-64; SGA-n, Co-b, *Pt*)

708-P. Activities of Aluminum and Iron in Iron Aluminum Melts at 1600° C. R. D. Pehlke. *Metallurgical Society of AIME, Transactions*, v. 212, Aug. 1958, p. 486-487.

(P12b; M24b, Al, Fe)

709-P. Relationship Between Electrical and Thermal Conductivities of Titanium Alloys. H. W. Deem, W. D. Wood and C. F. Lucks. *Metallurgical Society of AIME, Transactions*, v. 212, Aug. 1958, p. 520-523.

Expression for calculating thermal conductivity from electrical conductivity. 7 ref. (P11h, P15g; Ti-b)

710-P. Activity of Oxygen in Liquid Iron Alloys. T. P. Floridis and J. Chipman. *Metallurgical Society of AIME, Transactions*, v. 212, Aug. 1958, p. 549-553.

Additions of Co, Mo, W, and Pt increase O_2 activity coefficient whereas Cn and Au decrease it. 19 ref. (P12b, 2-60; Fe-b, *Co, Mo, W, Pt, O, Cu, Au*, 14-60)

711-P. Solid Solubility of Phosphorus in Nickel. J. Koeneman and A. G. Metcalfe. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 571-572.
(P12e; Ni-b, *P*)

712-P. Use of Resistivity of Copper at Low Temperatures to Evaluate Purity in Relation to Performance of Copper Oxide Varistors. J. E. Kunzler and J. H. Scaff. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 635-637.
(P15g; Cu)

713-P. Thermoelectric Power of Some Bismuth Alloys. James C. M. Li. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 661-664.
Bi-Ti, Bi-In and Bi-Mg alloys. 25 ref. (P15g, 2-61; *Bi-b,* Ti, In, Mg, 5)

714-P. Occurrence of Oxygen in Cast Iron. Gustaf Ostberg. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 678-686.
Oxygen solubility in cast iron. Equilibria between oxygen, carbon and silicon in molten iron alloys. 19 ref. (P12e, S11r; CI, *O, C, Si*)

715-P. Effect of the Order-Disorder Reaction on the Magnetic Anistrophy and Magnetostriction of Single Crystals of the Ferromagnetic Aluminum-Iron Alloys. R. C. Hall. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 703-706.
19 ref. (P16, N10; Al-b-Fe, SGA-n, 14-61)

716-P. Solubility and Precipitation of Vanadium Nitride in Alpha and Gamma Iron. R. W. Fountain and John Chipman. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 737-748.
Determined by Sievert's technique at 750-1200° C. Activity coefficient of N_2 decreased by V. 29 ref.
(P12e, P12b, N7b; Fe-b, *V, N*)

717-P. Electrical Properties of Cu-Mn-Al-In-Fe and Cu-Mn-Al-In-Ni-Fe Alloys. D. D. Pollock and D. I. Finch. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 841-846.
Resistivity, temperature coefficient and thermo-electric power at room temperature depends on composition. 6 ref.
(P15, 2-60; Cu-b, *Mn, Al, In, Ni, Fe*)

718-P. Stress and Electro-Potential of Copper Wires. K. Nobe, O. K. Miniato and W. F. Seyer. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 884-889.
Emf. measured for a cold worked wire and an annealed wire in sodium chloride and copper sulphate solutions. Emf. varies with stress. 15 ref. (P15g, 3-68; Cu, 4-61)

719-P. Activity Coefficients of MnO and FeO in Openhearth Slags. H. L. Bishop, Jr., N. J. Grant and J. Chipman. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 890-892.
Liquid slags equilibrated with molten carbon-free Fe at 1530-1700° C. Coefficients as function of composition. 6 ref.
(P12b; RM-q, ST-e, *Fe, Mn, O*)

SECTION Q

MECHANICAL PROPERTIES and TEST METHODS; DEFORMATION

1-Q. Mechanical Properties of Uranium-Molybdenum Alloys. M. B. Waldron, R. C. Burnett and S. F. Pugh. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 151-162. (CMA)

Properties of 14% Mo alloy were determined up to 800° C. for a variety of heat treatments; hardness; Young's modulus; elongation and age hardening in terms of solid solutions in α and γ-U; γ decomposition yielding two-phase structures; decomposition effect at high temperatures; effect of ordering in the γ-phase. (Q general, 2-67; U, *Mo*)

2-Q. Case Against the Tension Test. John B. Caine. *Foundry,* v. 85, Nov. 1957, p. 86-92.

Examples of catastrophic brittle failures; causes of failure do not include tensile ductility; fatigue strength cannot be evaluated by the tension test; brittle fracture, fatigue fracture, tensile strength are analyzed in relation to steel, nodular, cast and malleable iron. 11 ref. (Q26, Q27, Q7; ST, CI)

3-Q. Mechanical Properties of Zirconium and Zirconium-Uranium Alloys Containing Tin. A. D. Schwope, G. T. Muehlenkamp and W. Chubb. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-770, Sept. 29, 1952, 18 p. (CMA)

Alloys investigated were Zr-2.5Sn, Zr-3.4U and Zr-U-Sn. Tensile tests show that tin had a strengthening effects. In creep tests Zr-2.5 showed high initial deformations but hardly measurable extension afterward when stresses were high. This did not occur when stresses were low. The hot hardness of the Zr-Sn and Zr-U alloys was about the same.
(Q27a, Q3m, Q29p, 2-60; Zr, *U, Sn*)

4-Q. Mechanical Properties and Microstructure of Annealed Zirconium. W. L. Mudge. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-T-46, June 10, 1953, 24 p. (CMA)

Mechanical properties vary with the state of anneal. Hardness was used as an index of annealing conditions. Creep strength and tensile strength are more sensitive to changes of the annealed state than yield strength. 9 ref.
(Q general, 2-64; Zr)

5-Q. Effects of Neutron Bombardment Upon the Properties of Zircaloy-2. M. L. Bleiberg. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-MDM-10, May 19, 1954, 15 p. (CMA)

Property changes in Zircaloy-2 wrought by irradiation in high-temperature water. Electrical resistivity increased 15%, hardness increased 33 DPH, and notch toughness decreased at low temperatures and increased at high. Notch toughness was not a function of fast flux.
(Q29n, Q23s, P15g, 2-67; Zr)

6-Q. Titanium. K. E. Mead. *U. S. Atomic Energy Commission,* AECU-3532, May 13, 1957, 25 p. (CMA)

The properties of Ti-8Mn, Ti-5Al-2.5Sn, Ti-4Mn-4Al and Ti-6Al-4V as well as other titanium alloys. Fabrication, soldering, brazing, welding and costs; tensile and creep properties at high temperatures. Safety precautions against titanium fires, dust and explosions. Properties apparently suffer little damage when subjected to a high total dosage of radioactivity. 12 ref.
(Q general, 2-67, A7p; Ti)

7-Q. Ductility in Beryllium Related to Grain Orientation and Grain Size.

Jacob Greenspan. Nuclear Metals, Inc. *U. S. Atomic Energy Commission,* NMI-1174, Aug. 9, 1957, 39 p.
18 ref. (Q23p, M27c; Be)

8-Q. Effects of Notch Depth and Low Temperature on the Tensile Properties of Titanium. G. W. Geil and N. L. Carwile. *U. S. National Bureau of Standards.* Summary Technical Report 2163, Oct. 1957, 11 p.

Strength and ductility characteristics of annealed, commercially pure titanium. (Q27a, 2-63; Ti-a)

9-Q. Spot-Welded Joints in Titanium Alloys and Their Behavior in Fatigue. W. H. Kearns, W. S. Hyler and D. C. Martin. Wright Air Development Center, Technical Report 54-609. *U. S. Office of Technical Services,* PB 128518, Mar. 1955, 31 p. (CMA)

Tests on sheets of commercially pure titanium, commercial Ti-7Mn, experimental unalloyed Ti and Type-321 stainless. Joints in stainless were slightly better than in Ti, while the latter were significantly better than in clad 24S-T and 75S-T Al. (Q7a; Ti, SS, Al, 7-51)

10-Q. Effect of Hydrogen on the Mechanical Properties of Titanium and Titanium Alloys. G. A. Lenning, L. W. Berger and R. I. Jaffee. U. S. Watertown Arsenal Laboratory, Report 401/79-32. *U. S. Office of Technical Services,* PB 125201, July 1955, 57 p. (CMA)

Notched and unnotched fatigue tests on commercial A-55 and Ti-8Mn indicate that as much as 400 ppm. hydrogen does not significantly alter the fatigue properties. Effect of beta-stabilizing additions on the hydrogen tolerance of alpha titanium alloys; 2% Mo showed the greatest benefit. Hydrogen tolerance for high notch-bend impact properties was increased from about 100 to at least 200 ppm.
(Q7a, Q6n, 2-60; Ti, *H*)

11-Q. Flow Properties, Deformation Textures and Slip Systems of Titanium and Titanium Alloys. F. C. Holden, D. N. Williams, W. E. Riley and R. I. Jaffee. Battelle Memorial Institute, Titanium Metallurgical Laboratory, Report 30. *U. S. Office of Technical Services,* PB 121608, Jan. 1956, 102 p. (CMA)

Methods used to predict formability; flow properties of a number of experimental titanium alloys. The effects of strain transformation, temperature and hydrogen on flow properties. Deformation mechanisms of alpha-titanium at several temperatures, and types of deformation textures. (Q23q, Q24, M26c; Ti)

12-Q. Effect of Impact on Beams and Welded Structural Connections. Paul J. Brennan and Harry A. B. Wiseman. *Welding Journal,* v. 36, Oct. 1957, p. 465s-472s.

Under static and dynamic loading conditions. Timestrain curves are given. (Q6; 7-51)

13-Q. Stress Relieving of Weldments. Earl R. Parker. *Welding Journal,* v. 36, Oct. 1957, p. 433s-441s.

Origin, nature and effect of residual stresses and influences of thermal and mechanical stress-relieving treatments on service performance of welded structures. 23 ref.
(Q25h, J1a, G23; 7-51)

14-Q. (Russian.) **Influence of Titanium and Nitrogen on the Structure and Properties of Welded High-Chromium Thin Sheet Steel.** D. A. Odesskii and V. M. Vozdvizhenskii. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1957, p. 42-46. (CMA)

In the zone adjoining the weld titanium steel presents large grains of ferrite that increase the brittleness of the material, whereas nitrogen steel (especially that containing 2% Ni) is free from this defect, the growth of ferrite grains being prevented by the formation of a continuous film of austenite around the grains. 8 ref.
(Q26s, 2-60, N3; AY, *Cr, Ti, N,* 7-1)

15-Q. (Russian.) **Cold Rolling of Sheet Steel Containing Vanadium or Aluminum for Deep Drawing of Automobile Body Parts.** D. A. Litvinenko, A. A. Rastorguev and V. K. Barzii. *Stal',* v. 17, May 1957, p. 445-449.

Low-carbon rimmed steels with addition of 0.03 to 0.04% V, or killed steels with 0.007% Al, have desirable properties for deep drawing and stamping. They show no draw lines after passing through the die. 4 ref. (Q23q, G4b; AY, 4-53)

16-Q. (Russian.) **Ductility of Cold Rolled Transformer Steel.** A. G. Petrenko, A. V. Smirnova and L. A. Kurtova. *Stal',* v. 17, May 1957, p. 453-456.

Lack of ductility in cold rolled transformer steel is generally caused

by carbide phase particles precipitating around grain boundaries. Repeated annealing at 750 to 850° C. reduces quantity of the carbide phase and increases ductility. 4 ref. (Q23p, N7; AY, SGA-r)

17-Q. Effect of Fretting on Fatigue Characteristics of Titanium-Steel and Steel-Steel Joints. W. L. Starkey, S. M. Marco and J. A. Collins. *American Society of Mechanical Engineers. Preprint 57-A-113,* Aug. 8, 1957, 10 p. 23 ref. (CMA)

(Q7, Q9q; Ti, ST)

18-Q. Instrument for Making Micro-Hardness Measurements at Elevated Temperatures. *Industrial Diamond Review,* v. 17, Sept. 1957, p. 177-178.

Developed by Camstock and Wescott Inc. for Watertown Arsenal. (Q29q, 2-62, 2-53)

19-Q. Micro-Hardness Testing: Experience With the G. K. N. and Other Machines. R. Wall. *Iron and Steel,* v. 30, Nov. 1957, p. 611-612.

(Q29q, 1-53)

20-Q. Frictional Heating and Its Influence on the Wear of Steel. N. C. Welsh. *Journal of Applied Physics,* v. 28, Sept. 1957, p. 960-968.

High frictional temperatures during dry or imperfectly lubricated rubbing of steel produce gross structural changes and intense hardening of surface layers. Protective layer establishes itself more readily as carbon content of steel increases, a feature explained by ease with which eutectoid pearlite transforms to austenite, and thence to martensite, during rapid temperature cycle. By stimulating hot spots during wear by thermal action of electric sparks, hardness change is shown to be intensified by nitrogen or carbon adsorbed from atmosphere or lubricant. 24 ref. (Q9p; ST)

21-Q. Plastic Deformation of Copper and Silver Whiskers. S. S. Brenner. *Journal of Applied Physics,* v. 28, Sept. 1957, p. 1023-1026.

Studied by rapidly reducing stress after yielding. Whiskers exhibit extremely sharp yield points and extensive easy "glide" regions due to propagation of Luder's bands. It is unlikely that sharp yield points are caused by dislocation pinning. Propagation of Luder's bands often becomes obstructed, giving rise to repeated yielding in plastic region. Nature of these obstructions and mechanism of Luder's band propagation are not clear. 8 ref. (Q24; Au, Ag, 14-61)

22-Q. Columbium, Tantalum, Tungsten and Molybdenum. *Materials in Design Engineering,* v. 46, Sept. 1957, p. 85. (CMA)

Tabulated data on physical, mechanical, fabricating and corrosion resistant properties. Applications given. (Q general, P general, R general; Cb, Ta, W, Mo, 17-57)

23-Q. Equipment and Procedures for Rapid Heating and Testing. *Metal Progress,* v. 72, Nov. 1957, p. 97-100.

Advanced electronic equipment is needed to measure and record accurately the temperature and deformation in tests completed in seconds. Rapid heating is done by electrical resistance or in hot fluid. Results vary widely unless test conditions and metallic state are rigidly controlled. (Q general, 1-53, 2-62)

24-Q. Observation on the Distribution of Slip in Polycrystalline Copper. D. S. Kemsley. *Philosophical Magazine,* v. 2, 8th Series, Sept. 1957, p. 1103-1104.

Concentration of slip into bands increases with increasing prior tensile and fatigue deformation. 7 ref. (Q24a; Cu)

25-Q. Velocity of Sound in Metals at High Temperatures. J. F. W. Bell. *Philosophical Magazine,* v. 2, 8th Series, Sept. 1957, p. 1113-1120.

A pulse method of measuring the velocity of sound in thin rods over a wide temperature range, in some cases to the melting point, has been developed. Measurements on Al, brass, Ni, Fe, Pb, solder and Tl show that, in the strain-free condition, the method is a sensitive indication of physical and structural changes. The changes associated with the onset of a liquid phase, the Curie point, order-disorder and other structural changes described. 3 ref. (Q21f, 2-62)

26-Q. (German.) **Relation Between Rockwell C Hardness and Rockwell Hardness at 62.5 KP.** S. Sohrmann. *Fertigungstechnik,* v. 7, July 1957, p. 334-335.

For hardness tests on thin layers (carburized rims or sheets), the depth of penetration using the standard Rockwell-C test is too great. By reducing the test load from 150 kp. to 62.5 kp. satisfactory conditions were obtained. A conversion formula was developed. (Q29e)

27-Q. (German.) **Influence of Additives Upon the Behavior of Brass Under Load and at Elevated Temperatures.** J. Herenguel and M. LeNouaille. *Metall,* v. 11, Aug. 1957, p. 652-655.

Low-phosphorus and Mg additions and to a smaller degree, Cr, add to the strength of brass under heat. These additions help to prevent intercrystalline embrittlement, especially in hot forming. Bi, As and Sb have adverse effects as additives. 5 ref. (Q27, Q26s, 2-60; Cu-n)

28-Q. (German.) **Creep Properties of Soft Solders.** E. Dürrwächter. *Metall,* v. 11, Sept. 1957, p. 740-742.

Several soft solders were subjected to hardness tests, under load for periods up to 30 min. Hardness decreased with increasing time. Additions of Ag and Sb improved the creep properties of pure Sn solders, as did Ag with Cd-Sn solders. Ag does not have any influence on Pb-Sn solders. 6 ref. (Q3, Q29, 2-60; Sn, Cd, Pb, *Ag, Sb,* SGA-f)

29-Q. (German.) **Electrons in the Wear Process.** H. Rörig. *Metall, v.* 11, Sept. 1957, p. 768-769.

Under severe wear conditions surfaces undergo a process of chemical activation, resulting from an emission of electrons. (Q9)

30-Q. (German.) **Mechanical Properties of Hard-Drawn Spring Wire.** Franz Bleilöb and Emil Schücker. *Stahl und Eisen,* v. 77, Oct. 3, 1957, p. 1362-1368.

Minimum values obtainable for reduction of area, shear value at rupture and number of torsions are dependent on wire diameter for classes of mechanical strength provided for. Comparison between configuration of the rupture in torsion and the number of torsion cycles. Coiling and bend test. (Q general; ST, 4-61)

31-Q. (Italian.) **Behavior of Alloy Steels at Subzero Temperatures.** *Nickel,* no. 67, Apr. 1957, p. 1-15.

Effects of subzero temperatures on mechanical properties of steels and influence of some alloying elements, particularly Ni, of hardening and tempering, and of welding. Tabulation of properties at below zero of four En-series steels (23, 24, 25 and 30B) similar in composition to Italian standards.
(Q general, 2-63, 2-64; AY, SS)

32-Q. (Russian.) **Mechanism of Plastic Deformation and Mechanical Properties of Aluminum.** E. S. Yakovleva. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 306-309.

Mechanical properties of Al wire stretcher at rate of 7.3×10^4, 73 and 2.3% and at temperatures of −196, 18 and 250° C., respectively. 9 ref. (Q general; Al, 4-61)

33-Q. (Russian.) **Properties and Structure Changes in Solid Solutions Containing Nickel.** Sh. Sh. Ibragimov and B. G. Livshits. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 315-318.

Changes of microstructure and properties of solid solutions of Ni-Cr and Ni-Cr-Fe due to hot and cold working. Anomalous character of the changes can be explained by diffusion of atoms within the lattice of the solid solution. Kinetics and activation energy of the process. 4 ref. (Q general, M27, 3-68, Ni, SS)

34-Q. (Russian.) **Internal Friction of Pure Metals in Respect to Temperature.** V. S. Postnikov. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 344-351.

Determination of internal friction of Al, Cu, Ni, Fe, Co, Ti, Mo, W, Sn, Pb, Mg, Ag, Au, and Pt, applying method of twisting swings of small amplitude. 13 ref. (Q22, 2-61)

35-Q. (Russian.) **Residual Stresses in Surface Hardened Products After Annealing at the Breakdown Temperature of Martensite.** N. M. Korbin and K. V. Shishokina. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 29-33.

A change in sign (from negative to positive) of the residual stresses takes place in the hardened layer when annealed at the breakdown temperature of martensite. 8 ref. (Q25h, N8p, J23; ST)

36-Q. (Russian.) **Effect of Additions on the Plasticity of Brass No. L62.** A. A. Presnyakov. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 53-55.

Alloy additions and varying temperatures change the plasticity of brass and influence its resistance to tear and deformation. 8 ref. (Q24, 2-60; Cu-n)

37-Q. (Russian.) **Study of Zones of Failure in Creep.** I. L. Mirkin and I. I. Trunin. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 2-7. (Also available as Henry Brutcher Translation No. 3979.)

Microhardness was reduced near the fissure developed by creeping. This may be explained by fine cracks

in the material which have grown out of an accumulation of voids in the crystal lattice along the line of failure. 11 ref. (Q3, M26)

38-Q. (Russian.) **Softening of Metals Subjected to Plastic Deformation.** V. N. Danilov. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 15-16.

The effect of deformation was measured by application of a thermo-electromotive force whose coefficient bears a direct relationship to metal strength, and by measuring microhardness. 9 ref. (Q24, P15, Q29q)

39-Q. (Russian.) **Correlation Between Endurance and Prolonged Stress of Alloys at Elevated Temperatures.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 17-23.

Curves of endurance and prolonged stress cross each other when plotted on stress-versus-time to failure coordinates. 10 ref. (Q7a, Q25, 2-62)

40-Q. (Russian.) **Summary of Discussion on Temper Brittleness.** V. D. Sadovsky. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 24-42. (Also available as Henry Brutcher Translation No. 3980 and 4043.)

Temper brittleness appears to be the effect of segregation of the phases in the solid state at the grain boundaries and also within the grains, or mosaic-like blocks resulting from prolonged cooling, or sudden cooling from high temperatures. 58 ref. (Q26s; ST)

41-Q. (Russian.) **Effect of Hydrogen on the Brittleness of Titanium Welded Joints.** S. M. Gurevich. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 47-50.

Within the range of 0.01 to 0.5% hydrogen content brittleness increases with a corresponding decrease in plasticity. 11 ref. (Q26s, 2-60; Ti, *H,* 7-51)

42-Q. (Russian.) **Effect of Surface Conditions of Steel 30KhGSA on Tendency Toward Fatigue.** T. K. Zilova, V. E. Sadovskii and N. I. Demina. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 2-7.

Sensitivity of this steel toward fatigue increases when its surface is hardened either by heat or mechanical treatment. 4 ref. (Q7a; AY)

43-Q. (Russian.) **Influence of Cross Section on the Properties of Alloy ML5.** N. M. Techova and V. A. Blochina. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 16-19.

In samples with annular cross section the rate of decreasing strength at high temperatures is markedly lower than that of smooth samples. (Q27, 2-62)

44-Q. (Russian.) **Properties of Sh X 15 Steels at Low Temperatures.** A. N. Istomina. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 24-27.

Mechanical properties were not greatly affected to −60° C., but at −180° C. their relative compressive strength was considerably lowered. 5 ref. (Q general, 2-63; AY)

45-Q. (Russian.) **Effect of Trimmed Edges on the Properties of Cold Rolled Strip.** P. S. Sacharov. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1957, p. 43-46.

Trimming causes cold brittleness along the edges of the strip. Removing burr only on one side has little effect, but rounding the edges restores some of the original plasticity. Best results are obtained through heat treatment. (Q26s, F29q; 4-53)

46-Q.* **Cleavage Step Formation in Brittle Fracture Propagation.** J. M. Berry. *American Society for Metals, Transactions,* v. 51, Preprint no. 57, 1957, 44 p.

Some of the metallographic features of brittle fracture propagated at high velocities in single crystals of Si-Fe and a discussion of the three-dimensional geometry of the varied markings observed on the fracture surfaces. 10 ref. (Q26s, Q26n, M27; Fe, *Si,* 14-61)

47-Q.* **Unique Deformation and Aging Characteristics of Certain Magnesium-Base Alloys.** S. L. Couling, J. F. Pashak and L. Sturkey. *American Society for Metals, Transactions,* v. 51, Preprint no. 59, 1957, 20 p.

Certain Mg alloys exhibit unlimited cold rollability. A plot of per cent rolling reduction versus tensile yield strength for these alloys shows the yield strength to reach a maximum at about 15% reduction, and to decrease progressively from this point on with increasing reductions. Aging the cold rolled material at a low temperature raises the yield strength; the greater the rolling reduction, the higher the yield strength on subsequent aging. The deformation mechanism operative in these alloys which accounts

for their unusual property variations is described and the probable aging mechanism discussed. 10 ref. (Q24, N7, F23; Mg)

48-Q.* Effect of Grain Size and Carbon Content on the Yield Delay-Time of Mild Steel. J. M. Krafft and A. M. Sullivan. *American Society for Metals, Transactions,* v. 51, Preprint no. 65, 1957, 31 p.

The delay time for onset of gross yielding after sudden application of constant stress has been measured for mild steels of varied carbon content and grain size. The delayed yield is thought to provide a measure of the upper yield point sufficiently exact to permit a separation of the effects of some of the principal metallurgical parameters upon it. 17 ref. (Q21, 2-60, 3-71; CN)

49-Q.* Temperature and Stress Dependence of the Atmophere Effect on Nichrome V. Paul Shahinian and M. R. Achter. *American Society for Metals, Transactions,* v. 51, Preprint no. 69, 1957.

Creep-rupture tests have been performed in vacuum and air on Nichrome V at a range of temperatures and stresses. While the alloy tends to be stronger in air than vacuum at high temperatures and low strain rates, the reverse is true at low temperatures and high strain rates. 4 ref. (Q3m, 2-61, 3-66; Ni)

50-Q. Compilation of Chemical Compositions and Rupture Strengths of Super-Strength Alloys. *ASTM Special Technical Publication* No. 170-A, 6 p.

Name, nominal chemical composition, characteristic rupture strengths for rupture in 100 and 1000 hr., and patentee for approximately 150 domestic and 75 foreign alloys. Includes ferritic (martensitic) alloys and age-hardening stainless steels. Conventional austenitic stainless steels are not included. (Q3m; SS)

51-Q.* Practical Wear Testing of Cast Iron. R. B. Whitelaw. *Australian Institute of Metals, Journal,* v. 2, Aug. 1957, p. 54-65.

Reviews theories of wear with reference to cast iron, wear testing in the field and by means of laboratory testing machines. Use of Repco wear testing machine and comparison of microstructure, hardness and wear index of various types of cast iron. 12 ref. (Q9, 1-54; CI)

52-Q.* Effect of Prior Strain on the Creep of High-Purity Lead. R. C. Gifkins. *Australian Institute of Metals, Journal,* v. 2, Aug. 1957, p. 66-71.

Effect of small amounts of prior stain on creep at stresses of 400 psi. on vacuum cast and extruded high-purity lead. 19 ref. (Q3, 3-68; Pb-a)

53-Q.* Theories of Metallic Creep. J. M. Summerton. *Birmingham Metallurgical Society, Journal,* v. 37, Sept. 1957, p. 537-552.

Characteristic creep curves, time laws and theories of creep. Note on structural changes during creep. 37 ref. (Q3)

54-Q.* Properties Revealed by Tensile Tests on Pearlitic Nodular Irons. G. N. J. Gilbert and K. B. Palmer. *British Foundryman,* v. 50, Sept. 1957, p. 441-457.

Tensile properties at low, room and elevated temperatures in air, water, mercury and aliphatic hydrocarbons with variations in As, Sn, Si and P content and following normalizing. Variation in ductile to brittle transition and relationship of transition temperature to change in tensile strength and elongation with composition, normalizing and testing medium. Embrittlement at high temperatures. 4 ref. (Q27, Q23r; CI-r)

55-Q.* Influence of Heat Treatment Upon the Impact Properties of Spheroidal Graphite Cast Iron. J. H. Gittus. *British Foundryman,* v. 50, Sept. 1957, p. 466-474.

Specimens of spheroidal graphite cast iron after heat treatment to insure fully ferritic structure were subjected to a series of heat treatments and then tempered at 300, 350, 400 or 450° for 15 min., 30 min., 1 hr., 3 hr. or 24 hr. Impact values and fracture examination demonstrated influence of grain size and tempering treatments on the transition impact characteristics. 17 ref. (Q6n, 2-64; CI-r)

56-Q.* A Comparison of Methods of Assessing Spot-Weld Ductility in Sheet Steels. Pt. I. Experimental Investigation. E. J. French and A. A. Wells. *British Welding Journal,* v. 4, Nov. 1957, p. 514-529.

Theoretical strengths derived from a consideration of idealized welds are compared with experimental results. the cruciform tension test showing a high degree of ductility discrimination lacking in the shear and torsion tests. The ratio of experimental to theoretical tension strength and the tension ratio is

considered as a measure of spot-weld ductility together with other suitable tests. 17 ref.
(Q23p, Q27, 1-54; ST, 7-51)

57-Q.* Effect of Neutron Irradiation on the Mechanical Properties of Molybdenum and Tungsten. M. J. Makin and E. Gillies. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 108-112.

Changes in mechanical properties of stress-relieved Mo and fully recrystallized W after irradiation at 100° C. with 5×10^{19} neutrons per sq. cm. studied at a variety of temperatures; influence of irradiation on the ductile to brittle transition temperature. 14 ref.
(Q general, Q23r, 2-64; Mo, W)

58-Q.* A Compressive Creep Test of Alpha-Uranium Under Neutron Irradiation. H. C. Rose. *Institute of Metals, Journal,* v. 86, Nov. 1957, p. 122-128.

Apparatus designed for measuring compressive creep of U during irradiation in a Windscale pile—in particular, the behavior of alpha-U at 450° C. under a stress of 2.7 tons per sq. in. Irradiation does not appreciably affect the secondary creep rate at this temperature. A transient increase in creep rate, which may be due to thermal cycling, was observed on pile start-up after cooling down between creep runs. 11 ref. (Q3, 2-67; U)

59-Q. A New Way to Select Wear-Resistant Materials. J. R. Driear. *Iron Age,* v. 180, Nov. 21, 1957, p. 121-124.

Wear applications and suggested materials classified according to stress and self-lubrication properties. (Q9n, 17-57; SGA-m)

60-Q. Copper-Base Alloy Compares With Nickel Silver. C. H. Hannon. *Iron Age,* v. 180, no. 21, Nov. 21, 1957, p. 134-136.

(Q general; Cu, *Zn, Al, Ni, Ag*)

61-Q. Analysis of Stresses and Strains Near the End of a Crack Traversing a Plate. G. R. Irwin. *Journal of Applied Mechanics,* v. 24, Sept. 1957, p. 361-364.

Mathematical analysis, stress field near end of somewhat brittle tensile fracture in situations of generalized plane-stress or plane-strain approximated by the two parameter sets of equations—one, an adjustable stress parallel to the direction of crack extension and the other, the stress intensity factor, is proportional to the square root of the force tending to cause crack extension. 10 ref.
(Q25n, Q26q)

62-Q.* Specific Damping Energy of Fixed-Fixed Beam Specimens. W. C. Hagel and J. W. Clark. *Journal of Applied Mechanics,* v. 24, Sept. 1957, p. 426-430.

Internal damping effects of varying composition, heat treatment, cold work, magnetic field strength, stress history and static tension studied at room temperature on AISI 403 steel by fixed-fixed beam specimens supported in new bending vibration-decay apparatus. Experimental logarithmic decrements converted to specific damping energies by straightforward numerical method. 9 ref. (Q22; SS)

63-Q. Three Manganese Alloys Have Useful Thermal and Elastic Properties. John L. Everhart. *Materials in Design Engineering,* v. 46, Nov. 1957, p. 144-146.

Mn-Cu alloys, Mn-Ni-Cu alloys and ternary alloys containing Mn, Fe and 5% of Al, Co, and Ni.
(Q-general, P general; Mn, *Cu, Ni,* Fe, Co, Al)

64-Q.* Flow and Fracture. Earl R. Parker. *Metal Progress,* v. 72, Nov. 1957, p. 65-69.

Today, designers and constructors of advanced machines and structures are often hampered by inadequate materials, a dilemma which can be solved only after acquiring knowledge about crystalline structure at an atomic level. Progress in this line has been sufficient to devise substantial improvements in creep resistance. A ductile ceramic also seems a fairly early possibility. (Q24, Q26, N general)

65-Q.* Physical Properties of Electrodeposited Metals. Pt. 2. T. E. Such. *Metallurgia,* v. 56, Sept. 1957, p. 121-124.

Determination of tensile strength, ductility, hardness and internal stress in electrodeposited metals. 6 ref. (Q general; 8-62)

66-Q. Mechanics of Formation and Machine Shaping of Materials. *Metallurgia,* v. 56, Sept. 1957, p. 134-136.

Plastic flow under combined stresses, behavior of materials under high hydrostatic pressure and effect upon plastic properties of strain rate and temperature. Relation to behavior of metals in extrusion, forg-

ing, or rolling. 6 ref.
(Q23q, Q24, F general)

67-Q.* Hardness and Other Physical Properties of Metals in Relation to Temperature. E. R. Petty. *Metallurgia*, v. 56, Nov. 1957, p. 231-236.

Mode of deformation in the "equicohesive range" used to explain the form of the hardness-temperature relationship for pure metals. A simple correlation between hardness and creep properties is shown for a variety of metals. 38 ref.
(Q29, 2-61, Q3m)

68-Q.* Properties of Materials at High Rates of Strain. K. N. Leibovic. *Metallurgia*, v. 56, Nov. 1957, p. 239-241.

Propagation of stress waves; elastic and plastic strains; effect of high strain rate on yield and fracture; fundamental theory and experiments. 7 ref. (Q25n)

69-Q. Elastic Constants of Magnesium From 4.2° K. to 300° K. L. J. Slutsky and C. W. Garland. *Physical Review*, v. 107, Second Series, Aug. 15, 1957, p. 972-976.

Adiabatic elastic constants of Mg single crystals have been measured by an ultrasonic pulse technique. Values extrapolated have been calculated as well as Debye characteristic temperature at 0° K. Atomic force constants for a central-force model with an electron gas term were also obtained. 17 ref.
(Q21, 2-63; Mg)

70-Q.* Parts Made of Selected High Strength Cast Steels. Robert J. Ely. *Precision Metal Molding*, v. 15, Nov. 1957, p. 39-40, 96-97, 108-109.

Deoxidation practice, melting methods, chemistry and heat treatment of low-alloy martensitic steels. Effect of C, Si and dehomogenization; reproducibility of properties at 180,000 psi. and above.
(Q general, 3-70; AY, SGB-a)

71-Q. Bursting Tests of Zircaloy-2 Tubing. Pt. 1. Preliminary Investigation Using Tubes Machined From Bar Stock. B. R. Price and L. F. Cochrun. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission*, WAPD-FE-749, (no date), 38 p. (CMA)

(Q10b; Zr)

72-Q. Creep Strength of Uranium Alloys at 1500 and 1800° F. H. A. Saller, et al. Battelle Memorial Institute. *U. S. Atomic Energy Commission*, BMI-834, May 28, 1953, 30 p. (CMA)

(Q3m; U, *Mo, Zr, Ti*)

73-Q. Effect of Wall Thickness Tolerance on Some Properties and Failure Characteristics of Reference Size Zircaloy-2 Tubing. L. F. Cochrun. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission*, WAPD-FE-1004, Sept. 19, 1955, 9 p. (CMA)

(Q10b; Zr)

74-Q. Laboratory Bend Testing of Zircaloy-2. W. L. Frankhouser. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission*, WAPD-FE-1082, Oct. 18, 1955, 31 p. (CMA)

(Q5; Zr)

75-Q. Hydrogen Migration in Zircaloy-2. B. Lustman. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission*, WAPD-PWR-PMM-1053, Mar. 12, 1957, 14 p. (CMA)

(Q26s; Zr)

76-Q. Neutron Irradiation Effects on the Tensile Properties of Zircaloy-2. R. S. Kemper and D. L. Zimmerman. Hanford Works. *U. S. Atomic Energy Commission*, HW-52323, Aug. 22, 1957, 24 p. (CMA)

12 ref. (Q27a, 2-67; Zr)

77-Q.* Crack Initiation and Propagation in the V-Notch Charpy Impact Specimen. Carl E. Hartbower. *Welding Journal*, v. 36, Nov. 1957, p. 494s-502s.

Easily executed variation in the standard technique permits separation of crack-initiation and crack-propagation stages of the fracture process. The differentiation between ductile and brittle fracture is based on the concept that a brittle-fracture crack is propagated by continuous release of the elastic stress field, whereas a ductile-fracture crack requires plastic deformation to extend the crack. 9 ref.
(Q26, Q6; ST, 7-51)

78-Q.* Relation of Charpy Impact Properties to Microstructure of Three Ship Steels. W. S. Owen, D. H. Whitmore, Morris Cohen and B. L. Averbach. *Welding Journal*, v. 36, Nov. 1957, p. 503s-511s.

Extent to which fracture properties can be accounted for in terms of gross microstructural parameters. The ferrite-pearlite aggregate was varied systematically by means of

annealing and normalizing treatments, and correlations were obtained between several measured microstructural parameters and the Charpy V-notch transition temperature. 22 ref. (Q6, Q26, M27; ST)

79-Q.* X-Ray Diffraction for Residual Stress Measurements of Restrained Weldments. E. H. Kinelski and J. A. Berger. *Welding Journal,* v. 36, Dec. 1957, p. 513s-517s.

Theoretical and experimental studies indicate X-ray diffraction by the two-exposure method to be an excellent tool for the measurement of residual stresses in Monel plate weldments. (Q25h, M22g; Ni, 7-51)

80-Q.* Effect of Specimen Geometry on Charpy Low-Blow Transition Temperature. G. M. Orner and C. E. Hartbower. *Welding Journal,* v. 36, Dec. 1957, p. 521s-527s.

Variation in the standard technique for testing Charpy impact specimens permits a separation of the crack-initiation and crack-propagation stages of the fracture process. The technique requires initiation of a crack by means of a low-energy blow and propagation of the crack by a full-capacity blow of the impact-machine pendulum. Tests show the low-blow transition temperature to be independent of notch and specimen geometry within the limits of notch acuity and specimen size investigated. 9 ref. (Q6, Q26, 1-54)

81-Q.* Studies of the Weld Heat-Affected Zone of T-1 Steel. E. F. Nippes, W. F. Savage and R. J. Allio. *Welding Journal,* v. 36, Dec. 1957, p. 531s-540s.

Slow cooling rates after welding such as may result from either high energy input or high initial plate temperature have a damaging effect upon the notch toughness in the heat affected zone of T-1 steel. 16 ref. (Q23s; ST, 7-51)

82-Q. Micro Hardness Testing. R. Wall. *Wire Industry,* v. 24, Oct. 1957, p. 961.

Procedure and methods of testing wire specimens. Precautions for avoiding errors. (Q29q; 4-11)

83-Q. (Czech.) **Effect of Boron Addition on Properties of Structural Steels.** Vladimir Keclik. *Hutnicke Listy,* v. 12, 1957, p. 696-703.

Results of boron addition to normally killed steel and steel killed by large amounts of Al, Ti or Zr. Boron improves some properties of steel, most notably through hardening. Production difficulties.
(Q general; ST, *B,* AD-q40)

84-Q. (Czech.) **Influence of Residual Austenite in Carburized Layers on Behavior Under Alternating Stresses.** Bohumil Prenosil. *Hutnické Listy,* v. 12, 1957, p. 704-711.

Influence of residual austenite in carburized layers of alloy steels on the endurance limit under alternating stressing; compares endurance limits of specimens in which residual austenite is removed by low-temperature treatment with untreated specimens. 45 ref. (Q7a, N8; ST)

85-Q.* (French.) **Observation of Streaked Stress-Strain Curves in the Case of a Beta'-Matrix Brass.** Henri de Leiris. *Comptes Rendus,* v. 245, Sept. 9, 1957, p. 966-968.

Fluctuations in stress-strain curves may be due to modification of solubility of a second dispersed phase in the beta matrix. 4 ref.
(Q25n; Cu-n)

86-Q. (French.) **Influence of Silicon and Phosphorus on the Temper Brittleness of Malleable Irons.** Paul Bastien, Pierre Azon and Christiane Winter. *Fonderie,* no. 139, Aug. 1957, p. 343-352.

Malleable irons are often protected by galvanization. Subsequent embrittlement comes from the tempering galvanization treatment. Influence of the chemical composition of the iron. 7 ref.
(Q26s, 2-60; CI-s, *Si, P*)

87-Q. (French.) **Several Tests on a Standard Specimen Ingot With Iron Wedge.** *Fonderie,* no. 139, Aug. 1957, p. 363-366.

Shapes of easy to produce specimen ingot investigated. The specimen gives homogeneous characteristics throughout. (Q27, S22; ST, 5-59)

88-Q. (French.) **Mechanical Tests for Cast Irons.** *Machine Moderne,* v. 51, p. 61-66.

Tensile tests; static bending tests; relation between the properties of a cast Fe and its bending resistance; determination of the modulus of elasticity; shear, hardness and pressure tests; machinability.
(Q general; CI)

89-Q. (French.) **Study of Superficial Phenomenon Caused by the Drawing of Openhearth and Electric Steel.** Maurice Vauzelle. *Métaux-Corrosion-Industries,* no. 383-384, July-Aug. 1957, p. 269-285.

Hardness tests, X-ray diagrams and machining tests distinguish hardness variations caused by cold work, texture and internal stress. (To be continued.)
(Q29, G4; ST-e, ST-f)

90 Q. (German.) **Temper Brittleness of Structural Steel.** V. Kraus. *Fertigungstechnik,* v. 7, Aug. 1957, p. 367-372.

Tempering of different steel alloys; time-temperature effects; method for prevention of brittleness. 7 ref. (Q26s; J29; ST)

91-Q. (German.) **Investigation of the Strength of Copper-Titanium and Copper-Zirconium Alloys.** K. Dies. *Metall,* v. 11, Nov. 1957, p. 933-941. (CMA)

5 ref. (Q27a, Q7a; Cu, *Ti, Zr*)

92 Q. (Japanese.) **Effect of Excess Silicon in Aluminum-Magnesium-Silicon Alloys.** Hajime Yamada. *Light Metals,* v. 7, July 1957, p. 45-50.

Excess of Si in low-Mg alloys causes increased hardening, tensile strength, slight increase in electrical resistance and some increase in susceptibility to stress-corrosion. Aging time and corrosion resistance decreased. 3 ref.
(Q general; 2-60; Al, *Mg, Si*)

93-Q. **Abnormal Decay Patterns for Ultrasonic Waves in Metal Rods.** John Awatani and Hiroshi Miyamoto. *Institute of Scientific and Industrial Research, Osaka University Memoirs,* v. 14, 1957, p. 47-52.

Anomaly in decay patterns observed in attenuation measurements is investigated for longitudinal ultrasonic waves in cylindrical rods. Anomaly appears to be due to (1) interference among several modes excited in the rod by a quartz crystal transducer, and (2) residual stresses or fiber structure resulting from production processes. For some materials an appropriate annealing operation can eliminate the second cause. A formula is derived for determining whether or not abnormal decay is due between observed modes. 4 ref.
(Q22f; Al, Si)

94-Q. **Some Properties of Zirconium-Niobium Alloys.** Yu. F. Bychkov, A. N. Rozanov and D. M. Skorov. *Journal of Nuclear Energy,* v. 5, no. 3/4, Pt. II. (Translated by Pergamon Press); also *Soviet Journal of Atomic Energy,* v. 2, no. 2, 1957, p. 402-407. (Translated by Consultants Bureau, Inc.) (CMA)

Previously abstracted from original. See item 513-Q, 1957.
(Q27a, Q29n, 2-62, M24a; Zr, Cb)

95-Q. **Young's Modulus of Zirconium-Niobium Alloys.** Yu. F. Bychkov, A. N. Rozanov and D. M. Skorov. *Journal of Nuclear Energy,* v. 5, no. 3/4, Pt. II. (Translated by Pergamon Press); also *Soviet Journal of Atomic Energy,* v. 2, no. 2, 1957, p. 408-412. (Translated by Consultants Bureau, Inc.) (CMA)

Previously abstracted from original. See item 514-Q, 1957.
(Q21a, 1-54, 2-64; Zr, Cb)

96-Q.* **Improved Formability of Galvanized Sheet.** J. R. Kattus. *Metal Progress,* v. 72, Dec. 1957, p. 82-85, 140.

High-speed tensile tests, on both smooth and notched specimens, show significant differences between the properties of galvanized sheet that are acceptable and those that are susceptible to breakage in fabrication on a Lockformer machine. The notched ultimate strength provides the best measure of performance, increasing strength being indicative of increasing susceptibility to breakage. (Q23q, Q27a, 3-67; ST, Zn, 4-53)

97-Q. **Strain Sensitivity of Some Mechanical Properties and Failure Characteristics of Zircaloy-2 Tubing.** L. F. Cochrun. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-FE-1005, Sept. 14, 1955, 9 p. (CMA)

Results evaluated for the bursting pressure, precent circumferential strain at bursting, area of crack opening and hole size of fracture. (Q27a, 3-68; Zr, 4-60)

98-Q. **Weight - Shape Conversion Tables for Zircaloy-2.** J. G. Goodwin. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-TM-86, May 10, 1956, 11 p. (CMA)

(Q general; Zr)

99-Q. **Tensile Properties and Metallographic Study of Zircaloy-3 Strip.** R. L. Mehan. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-RLM-12, June 13, 1957, 55 p. (CMA)

(Q27, M27; Zr)

100-Q. **Evaluation of the Engineering Properties of Titanium Carbide Base Cermets.** J. C. Redmond, et al. Wright Air Development Center, Tech-

nical Report 57-25. *U. S. Office of Technical Services,* PB 131026, July 1956, 67 p. (CMA)

TiC-base cermets were evaluated in impact tests, fatigue tests and by testing tensile stress-strain to rupture.
(Q general; Ti, C, *Ni, Cr, W,* 6-70)

101-Q.* Discussion of Some Models of the Rate-Determining Process in Creep. N. F. Mott. Paper from "Creep and Fracture of Metals at High Temperatures", p. 21-24.

Attempts to account for some of the facts of creep in terms of the movement of dislocations. Maintains that there are great difficulties in accepting the hypothesis of "climb" of dislocations, and that cell formation (polygonization) may occur through slip alone. In this case the rate-determining process must be slip and it is suggested that the barriers of greatest importance are jogs in screw dislocations. A stress-dependent activation energy for creep, which approaches that for self-diffusion at low stresses, results from this model. 14 ref. (Q3n, Q24a)

102-Q. Plastic Deformation of Aluminium Single Crystals at Elevated Temperatures. R. D. Johnson, A. P. Young and A. D. Schwope. Paper from "Creep and Fracture of Metals at High Temperatures", p. 25-46.

Creep tests were performed at elevated temperatures while maintaining a constant resolved shear stress to study the nature of the creep curve in crystals oriented for single slip on a (111) plane. Constant-load creep tests were employed to determine empirically the amount by which a high-temperature slip system, containing either a (100) plane or a plane tentatively identified as either a (311) or a (211) plane, had to be favored in order to operate. 43 ref. (Q3, Q24a, 2-62; Al, 14-61)

103-Q.* Mechanism of Grain Boundary Displacement and Its Relation to the Creep Process as a Whole. F. N. Rhines. Paper from "Creep and Fracture of Metals at High Temperatures", p. 47-57.

Study of the tensile creep behavior of pure Al bicrystals, having flat grain boundaries at 45° to their axes of loading. These specimens each had photo-engraved, upon one face, a reference pattern (of 133 squares to the in.) that facilitated the measurement of both the grain boundary displacement and the concurrent extension of the grains themselves. About 100 such bicrystals were tested within a temperature range of 200 to 650° C. and a stress range of 10 to 1600 psi., the duration of single tests attaining an exceptional maximum of one year. 8 ref. (Q3, N3; Al)

104-Q.* Creep Processes. W. A. Wood. Paper from "Creep and Fracture of Metals at High Temperatures," p. 59-71.

How crystalline structure responds to the corresponding kinds of deformation. Takes as basis of comparison the structural changes in the standard tensile test at room temperature and contrasts with these the changes peculiar to slow straining at elevated temperatures. The comparison shows that the latter introduces new structural features, described as stress-recovery, equilibrium flow and boundary flow. 24 ref. (Q3, M27)

105-Q.* Interaction Between Crystal Slip and Grain Boundary Sliding During Creep. D. McLean. Paper from "Creep and Fracture of Metals at High Temperatures", p. 73-78.

Rotation of subcrystals in Al during creep is shown to be proportional to elongation, from which it is deduced that practically all the crystal deformation occurs by a normal glide process. The amount of grain boundary sliding occurring in Al and Cu during creep is shown to be proportional to elongation, suggesting that a linear interaction exists between crystal slip and grain boundary sliding. 22 ref. (Q3, Q24a; Al)

106-Q.* Some Fundamental Experiments on High Temperature Creep. John E. Dorn. Paper from "Creep and Fracture of Metals at High Temperatures", p. 89-138.

At high temperatures creep strain appears to be a function of a temperature compensated time and stress. X-ray analyses and plastic properties reveal that the same structures are developed at the same values following creep at the same stress. 50 ref. (Q3, 2-62)

107-Q.* Creep and Aging Effects in Solid Solutions. A. H. Cottrell. Paper from "Creep and Fracture of Metals at High Temperatures", p. 141-155.

If recovery occurs during creep the creep resistance is reduced; if strain aging occurs it is increased. Aging in substitutional alloys is ac-

celerated during plastic flow. The minimum temperature for strain-age hardening during creep can be roughly estimated on the basis that vacancies are created during plastic flow and that these increase the rate of substitutional diffusion. 32 ref. (Q3, N7, N1)

108-Q.* Microstructure and Creep. J. W. Freeman and C. L. Corey. Paper from "Creep and Fracture of Metals at High Temperatures", p. 157-173.

Relationships between microstructure and creep reviewed from the viewpoint of extensive research on engineering alloys. Principles involved in solid solution, precipitation phenomena, cold work, multiphases, transformation structures, melting practice and grain size. 31 ref. (Q3, M27, N7)

109-Q.* Effect of Alloying on the Creep of Metals. L. Rotherham and C. R. Tottle. Paper from "Creep and Fracture of Metals at High Temperatures", p. 175-189.

Contributions to the understanding of creep have been made in two main directions, by analysis of experimentally determined creep curves, and by study of the factors affecting deformation. Using both methods, attempts have been made to predict the creep properties of alloys. The relationship between alloying and creep behavior appears capable of some degree of prediction. 66 ref. (Q3, 2-60)

110-Q.* Basic Principles of a Creep-Resisting Alloy. A. Constant and G. Delbart. Paper from "Creep and Fracture of Metals at High Temperatures", p. 191-214.

Essential part played in the resistance to creep by fine precipitates of additional phases, and the importance of heat treatment by which the nature, size and distribution of these precipitates can be controlled, with special reference to Cr-Mo-V steel. 27 ref.
(Q3, N7, 2-64; AY, *Cr, Mo, V*)

111-Q.* Creep of Solid Solutions and Compounds in Metallic Systems. I. I. Kornilov. Paper from "Creep and Fracture of Metals at High Temperatures", p. 215-219.

Alloys of continuous solid solutions, Mg-Cd, Cu-Ni, Fe-Ni; alloys of limited solutions of binary systems, Al-Mg, Ni-Cr, NiAl; alloys of ternary systems, Fe-Ni-Cr, Ni-Cr-Al, Ni-Cr-Ti, were investigated. 21 ref. (Q3, 14-67, 14-68)

112-Q.* Effect of Changing Loads During Creep. Y. N. Rabotnov. Paper from "Creep and Fracture of Metals at High Temperatures", p. 221-225.

Certain possibilities of the phenomenological description of one-dimensional creep in tension. Where the dependence between stress and strain is linear, a universal method which can be applied to a wide range of possible cases is that of Volterra's theory of hereditary elasticity. 4 ref. (Q3, Q25n)

113-Q.* An Approach to the Problem of Intercrystalline Fracture. R. Eborall. Paper from "Creep and Fracture of Metals at High Temperatures", p. 229-241.

Intercrystalline fracture behavior may be affected by viscous sliding of the boundaries and by other factors involved in the fracture process itself, as well as by the hardness of the crystals, which has an important effect in raising the local stresses. The fracture characteristics of an alloy may be greatly affected by small alloying additions, improved properties being obtained by adding high-melting point elements of "unfavorable" size factor. 46 ref. (Q26, 2-60)

114-Q.* Theory of Accelerated Creep and Rupture. C. Crussard and J. Friedel. Paper from "Creep and Fracture of Metals at High Temperatures", p. 243-262.

Experimental results on creep-rupture tests show the factors influencing the stability of the metal under test. Of the different causes of instability, some oppose rupture (boundary migration, recrystallization), others promote rupture (boundary-glide in certain cases, intergranular oxidation through a "micro-Kirkendall effect"). Rupture occurs through the slow formation of intergranular microcracks, which is itself caused by some intrinsic mechanism related to the recovery process occurring during creep. 50 ref. (Q3)

115-Q.* Theory of Brittle and Ductile Fracture With Application to Creep Fracture, Based on the Dynamic Behavior of Dislocations and Condensation of Vacancies. A. Kochendorfer. Paper from "Creep and

Fracture of Metals at High Temperatures", p. 263-280.

Suitable arrangements of dislocations lead to the break-up of the lattice if their energy is greater than the surface energy of the "holes" produced, a hole of this type being equivalent to a crack. A crack of atomic dimensions can be produced by a pile of single dislocations and grow to microscopic dimensions by means of further dislocations, the Griffith mechanism then leading to a brittle fracture. 62 ref. (Q26s, M26b)

116-Q.* Observations on Third Stage Creep and Fracture. C. H. M. Jenkins. Paper from "Creep and Fracture of Metals at High Temperatures", p. 287-298.

Tertiary creep and fracture have been studied in a number of materials by testing in a high vacuum to prevent oxidation over the range 15-950° C. The mode of deformation is greatly influenced by such changes as hardening by alloy additions, recrystallization, polygonization, spheroidization, age hardening, phase changes and even graphitization. The gradual onset of the effect of some of these factors as well as the development of cavities and cracks leads to tertiary creep. 7 ref. (Q3, Q26)

117-Q.* Tertiary Creep of Nimonic 80A. W. Betteridge. Paper from "Creep and Fracture of Metals at High Temperatures", p. 299-316.

Short-period low-stress torsional creep tests carried out at intervals during normal tensile creep experiments on Nimonic 80A have indicated that the number of available strain-promoting centers increases linearly with the tensile strain resulting from such centers and thus leads to the accelerating creep rate known as tertiary creep. This concept leads to a formula for the creep curve which agrees very accurately with the observed curves for this alloy. 4 ref. (Q3; SGA-h, Ni)

118-Q.* Grain Boundary Participation in Creep Deformation and Fracture. N. J. Grant. Paper from "Creep and Fracture of Metals at High Temperatures", p. 317-331.

Based on creep-rupture studies of a series of metals and alloys varying in composition from very high-purity aluminum to a complex age-hardenable gas turbine alloy, it is shown how alloying affects the behavior of grain boundary deformation and fracture. The ability of the grain boundary to recover is the major factor in determining the degree of embrittlement in high-temperature creep-rupture testing. 6 ref. (Q3, 2-60, Q26)

119-Q.* Investigations Into the Development of Intercrystalline Fractures in Various Steels Under Triaxial Stress. W. Siegfried. Paper from "Creep and Fracture of Metals at High Temperatures", p. 333-361.

Components used in mechanical engineering, even when made of heat resisting steels, often embody structural notches. As a result of the high temperatures at which heat resisting metals are utilized, modifications of the metal itself, such as aging, precipitation, recrystallization and alterations of phase, often occur with time. These processes greatly influence creep and must therefore be determined in some way when metals are tested. 15 ref. (Q3, 1-54, N general, Q25k)

120-Q.* Note on the Fracture Under Complex Stress Creep Conditions of a 0.5 Molybdenum Steel at 550° C. and a Commercially Pure Copper at 250° C. A. E. Johnson and N. E. Frost. Paper from "Creep and Fracture of Metals at High Temperatures", p. 363-382.

Little evidence is shown to support the Siegfried hypothesis that intercrystalline fracture is due to hydrostatic stress, and transcrystalline fracture to the maximum stress deviator. It is indicated by tests on both 0.5% Mo steel and Cu that the criterion of fracture may be the maximum principal (tensile) stress of the system imposed, irrespective of the actual physical nature of the fracture. (Q26r; AY, *Mo*, Cu-a)

121-Q.* Effect of a "V" Notch on the Tensile Creep Behaviour of a Molybdenum-Vanadium Steel. R. W. Ridley and H. J. Tapsell. Paper from "Creep and Fracture of Metals at High Temperatures", p. 383-401.

Tensile creep tests have been made on a Mo-V steel over the range 650-525° C. and at stresses of from 17 to 5 tons per sq. in. using test pieces in which a "V" notch had been machined circumferentially. The extent to which the presence of a "V" notch reduced the rupture life of the material at the notch by virtue of stress concentration ef-

fects is discussed and the effect of the notch on the amount of creep occurring. 9 ref.
(Q3, Q23s; AY, *Mo, V*)

122-Q. (English.) **Relaxation Phenomena of the Fatigue of Metals.** Noboru Okagaki. *Institute of Scientific and Industrial Studies, Osaka University, Memoirs,* v. 14, 1957, p. 53-56.

Structural changes during fatigue may be detected by internal friction measurements. 22 ref.
(Q7, Q22)

123-Q. (English.) **Relaxation Phenomena During the Plastic Flow of Metals Under Rapid Loading.** Noboru Okagaki. *Institute of Scientific and Industrial Research, Osaka University, Bulletin,* v. 14, p. 57-68.

Stress relaxation phenomena in mild steel at high temperatures may be an effect of decrease of elastic modulus. 17 ref.
(Q21, Q22, Q24; CN)

124-Q. (French.) **Study of the Structural Variations During the Deformation of a Stable Austenite or a Mild Iron.** Albert Portevin, R. Tamhankar, Gilles Pompey, Jean Plateau and Guy Henry. *Comptes Rendus,* v. 245, Sept. 30, 1957, p. 1132-1135.

Slip, polygonization and migration of grains. (Q24a, N3; ST)

125-Q. (French.) **Decrease of Mechanical Resistance of Copper Power Lines by Heat.** E. Freudiger. *Pro-Metal,* no. 10, Aug. 1957, p. 853-857.

The degree of cold work of the wire and the quality of the Cu used are most important factors. Composition and degree of cold work are chosen with these factors considered. For service above 80° C., Cu is alloyed with Cd or Ag. 7 ref. (Q general; T1b; Cu, *Ag, Cd*)

126-Q. (German.) **Aging and Fatigue of Steels.** Werner Doring. *Eisenbahntechnische Rundschau,* v. 6, Aug. 1957, p. 306-313.

(Q7, N7a; ST)

127-Q. (German.) **Notch Tensile Test and Its Application for Prediction of Brittle Fracture. Pt. I.** H. Flössner and K. Matthaes. *Schweizer Archiv,* v. 23, Aug. 1957, p. 249-258.

38 ref. (Q27d, Q26s)

128-Q. (German.) **Electronic-Microscopic Examination of Slip Band Formation in Copper Crystals.** Siegfried Chader. *Zeitschrift für Physik,* v. 141, Aug. 1957, p. 73-102.

37 ref. (Q24a, M21e; Cu)

129-Q. (German.) **Low Temperature in Internal Friction of Metals.** Hans Donth. *Zeitschrift für Physik,* v. 149, Aug. 1957, p. 111-130.

38 ref. (Q22, 2-63)

130-Q. (German.) **Brittle Fractures in Reinforcing Steel.** Stefan Soretz. *Zeitschrift des Osterreichischen Ingenieur und Architekter-Vereins,* v. 102, Sept. 3, 1957, p. 205-210.

Cause of cracking. 7 ref.
(Q26; ST)

131-Q. (Japanese.) **Cracking of Steel Bolt Heads.** K. Yokoyama and K. Yamamoto. *Japan Society of Mechanical Engineers, Journal,* v. 60, Oct. 1957, p. 1080-1085.

(Q26q; 7-54; ST)

132-Q. (Japanese.) **Coating for Analysis of Plastic Behavior.** K. Kawata and S. Suzuki. *Scientific Research Institute, Reports,* v. 33, July 1957, p. 177-184.

Study of plastic behavior (bending and tension) of steel with epoxy-rubber coating. Observation of slip phenomena.
(Q5, Q27a, Q24a; ST)

133-Q. (Russian.) **Effect of Structure on the Toughness of Titanium Carbide Inserts.** P. K. Mikhailova. *Stanki i Instrument,* v. 28, June 1957, p. 26-27.

Annular grain form definitely lowers the toughness of inserts, and must be regarded as defective.
(Q23, 3-71; Ti, 6-69)

134-Q. (Russian.) **Characteristics of Tungsten Carbide Cutters Bonded With Nickel or Cobalt.** N. F. Kazakov and M. N. Andrianova. *Stanki i Instrument,* v. 28, June 1957, p. 24-25. (Also available as Henry Brutcher Translation no. 3966, Altadena, Calif.)

Rate of wear of cutters bonded with Ni is higher than that of those bonded with Co. On the other hand, the wear shown by cutters bonded with Ni-Co is less than that of either Ni, or Co bonded bits.
(Q9n, T6n; W, *Ni, Co,* 6-69)

135-Q. (Russian.) **Cutters Cast From High Speed Steel.** M. S. Polak. *Stanki i Instrument,* v. 28, July 1957, p. 30-31.

Cobalt enters into solid solution and contributes desired hardness; physical characteristics are between those of metallic carbide components and alloys of solid solution type. Stellite-type alloys may be used in place of high-speed steel.
(Q29, T26n, TS-m)

136-Q.* **On the Necessity of Fundamental and Widened Research in Strength of Materials.** M. V. Zaustin.

ASTM Bulletin, no. 226, Dec. 1957, p. 52-61.

Suggestions for the improvement of methods of testing metal from the point of view of tension, compression, shear strength, impact, stress, ductility, fatigue, to enable more efficient design. 11 ref. (Q general, 1-54)

137-Q.* Brittle Fracture of Metals at Atmospheric and Sub-Zero Temperatures. C. F. Tipper. *Metallurgical Reviews,* v. 2, 1957, p. 195-261.

Conditions which cause brittle fracture in a ductile metal; deformation and fracture of crystalline aggregates; development of patterns on fracture surfaces; effect of a notch; effect of high rates of loading; effect of pre-strain on fracture; fatigue; assessment of brittleness by mechanical tests; types of notch bar test; metallurgical factors affecting fracture in steels and nonferrous metals; initiation and propagation of fracture. 247 ref. (Q26)

138-Q.* Watch Out for Compression Loads. *Product Engineering,* v. 28, Dec. 9, 1957, p. 72-75.

Effect of cold working; temperature effects; compression creep; sheet properties versus bar; how compression tests are run. (Q28)

139-Q.* Residual Stresses From Machining Operations. Pt. 2. Erik K. Henriksen. *Steel Processing and Conversion,* v. 43, Dec. 1957, p. 698-699, 710-711.

Materials tested were austenitic Mn steel and cast iron, Armco iron, free-machining and cast carbon steel. 36 ref. (Q25, G18: ST, CI, Fe)

140-Q. (Czech.) **Some Properties of Semi-Finished Duralumin Products and Their Heat Treatment.** Petr Skulari. *Hutnické Listy,* v. 12, Oct. 1957, p. 949-960.

Fabrication methods producing stress-free material of good formability. 10 ref. (Q23q, J27; Al)

141-Q. (English.) **Nomographic Method for Evaluating X-Ray Back-Reflection Patterns Used in the Computation of Residual Stresses in Steels.** I. S. Szanto. *Periodica Polytechnica,* v. 1, no. 2, 1957, p. 87-101.

7 ref. (Q25h, M22g; ST)

142-Q.* (German.) **Internal Stresses in Hardened Tool Steels and Development of Grinding Cracks.** Hans Bühler and Walter Schepp. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1686-1690.

Effect of transformation on the distribution of internal stresses in cylindrical specimens taken from various Ni steels poor in carbon. Distribution of stresses in specimens partly water quenched and taken from alloys containing: (a) 0.05% C and 17% Ni, (b) 1% C and 1.5% Cr, as well as from plain carbon toolsteels containing (c) 1% C and (d) 1.3% C. Magnitude of internal stresses present on the fresh surface after removal of layers of different thicknesses. (Q25, J26; TS, 9-72)

143-Q. (German.) **Structure and Surfaces of Metal in Cold Forming.** H. Wiegand. *Werkstatt und Betrieb,* v. 90, Nov. 1957, p. 769-775.

(Q23q, 3-71)

144-Q. (Russian.) **Relieving Residual Stresses From Cold Worked Bars by Means of Axial Strain.** I. V. Kudryavtzev and L. M. Rosenman. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1957, p. 7-13.

Samples were passed through a fixture with three rolls to produce surface stresses, then subjected to various fatigue tests. It is possible to conserve a part of the residual loading by means of axial loading. (Q25h, Q7, 4-55)

145-Q. (Russian.) **Process of Relaxation Under Condition of Repeated Stresses.** T. I. Volkova. *Metallovedenié i Obrabotka Metallov,* no. 7, July 1957, p. 13-18.

Certain mechanical parts which are habitually exposed to high temperatures or to stresses develop resistance to relaxation. It is desirable to avoid higher than working temperatures even for a short time between subsequent working loads. 6 ref. (Q25p, Q3, 2-62)

146-Q. (Russian.) **Estimation of Tendency of Steel to Become Brittle Under Service Conditions.** E. M. Shevandin. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 949-953.

8 ref. (Q26s; ST)

147-Q. (Russian.) **Method of Investigation of Metal Deformation at High Temperatures.** E. I. Belskii and R. I. Tomilin. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 957-958.

4 ref. (Q general, 2-62)

148-Q.* Mechanism of Fatigue: A Review. R. C. A. Thurston. *Canadian Mining and Metallurgical Bulletin,* v. 50, Dec. 1957, p. 708-716. (*Transactions,* v. 50, 1957, p. 390-398.)

Present-day theory of dislocations, mechanism of slip, initiation of fatigue cracks, subsequent propagation. 43 ref. (Q7, Q24a)

149-Q.* Fatigue in Mining and Construction Equipment. B. M. Hamilton. *Canadian Mining and Metallurgical Bulletin,* v. 50, Dec. 1957, p. 717-724.

Fatigue failures occur in load-carrying members of machine parts when they are subject to alternating or cyclic stresses. Fatigue is, therefore, most commonly found in moving parts which may become deflected due to overloading and poor alignment. However, intermittent shock loading or vibration can also contribute to fatigue failure in both moving and stationary parts. (Q7, T28)

150-Q. Wrought Aluminum Alloys in Order of Increasing Ultimate Strength. *Machinery,* v. 64, Oct. 1957, p. 257-258.

Lists the alloys and gives tensile strength, yield strength and hardness values. (Q27a, Q23b, Q29n; Al, 4)

151-Q.* Micro-Hardness Testing. R. Wall. *Metal Industry,* v. 91, Dec. 20, 1957, p. 521-522.

Experiences and results obtained over five years both from the laboratory point of view and as a production quality control method. (Q29q)

152-Q.* Elastic Moduli and Tensile Properties of Titanium-Carbon and Titanium-Aluminium-Carbon Alloys. H. Brooks, G. I. Lewis and J. I. M. Forsyth. *Metallurgia,* v. 56, Dec. 1957, p. 277-282.

Although tensile tests and dynamic measurements on hot rolled strip confirmed the beneficial effect of carbon additions on the tensile and shear moduli of Ti, carbon is considered unlikely to be used as a modulus-raising addition in commercial shear alloys unless its effect on service temperature ductility can be lessened. Ternary alloys containing both C and Al in amounts sufficient to give a significant improvement in modulus were found to be brittle. 8 ref. (Q21a, Q27a, 2-60; Ti)

153-Q. Micro-Hardness Testing. T. E. W. Preston. *Metalworking Production,* v. 101, Oct. 11, 1957, p. 1833-1836.

Microhardness testing unit attached to microscope barrel accurately measures pyramid indentations as small as 7 microns in diagonal. (Q29q, 1-53)

154-Q. How to Measure Principal Stresses. C. C. Perry. *Product Engineering,* v. 28, Oct. 14, 1957, p. 101-105.

Failure theories in stress analysis; distribution patterns for normal stresses, equations relating strain-gage readings and principal stresses and a method for using only one strain gage to find principal stresses. (Q25, X28j)

155-Q. Adhesion Testing. Peter J. Larsen. *Rubber Age,* v. 82, Dec. 1957, p. 485-486.

Types of tests used to determine adhesion value of metal-rubber bonds. (Q10c; K11c)

156-Q. How to Upgrade Cold Finished Steel. *Steel,* v. 141, Dec. 23, 1957, p. 66-69.

Results of experiments on higher reductions show that potential strength and toughness of carbon steels are practically untapped. (Q23q, Q23p, Q27a, 3-68; CN)

157-Q. Mechanical Properties of Unalloyed Chromium. S. A. Spachner and W. Rostoker. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 121895, Dec. 1957, 74 p. $2.

(Q general; Cr)

158-Q. Effect of Elevated Temperature on the Fatigue Strength of Sintered Aluminum Powder. W. S. Hyler and H. J. Grover. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131225, Aug. 1955, 50 p. $1.25.

(Q7a, 2-62; Al, 6-72)

159-Q. Effects of Physical Variables on Delayed Failure in Steel. R. D. Johnson, H. H. Johnson, J. G. Morlet and A. R. Troiano. Case Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 121456, 44 p. $1.25.

Effects of three specific variables —hydrogen distribution, test temperature and prestressing—on hydrogen-induced brittle fracture of 4340 steel in static fatigue. (Q7b, Q26s; ST)

160-Q. New Concept of Hydrogen Embrittlement in Steel. J. G. Morlet, H. H. Johnson and A. R. Troiano. Case Institute of Technology. (Wright Air Development Center.) *U. S. Of-*

fice of Technical Services, PB 131200, Mar. 1957, 50 p. $1.25.

(Q26s; ST)

161-Q. Dynamic Properties of Solids. Final Report. T. R. Cuykendall and H. S. Sack. Cornell University. (Office of Naval Research.) *U. S. Office of Technical Services,* PB 121701, Nov. 1955, 115 p. $3.

Determination of the elastic modulus and the internal friction of solids under alternating stresses.
(Q21; Q22)

162-Q. Evaluation of the Engineering Properties of Titanium Carbide Base Cermets. J. C. Redmond, R. J. Reintgen, J. R. Fenton and M. E. Simon. Kennametal Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131026, July 1956, 67 p. $1.75.

(Q general, 6-20; Ti)

163-Q. Steady-State Creep of Crystals. J. Weertman. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131132, Aug. 1957, 10 p. $.50.

(Q3n)

164-Q. Design Properties in High-Strength Steels in the Presence of Stress Concentrations and Hydrogen Embrittlement. Pt. 3. The Response of High-Strength Steels in the Range of 180,000 to 300,000 Psi. to Hydrogen Embrittlement From Cadmium Electroplating. E. P. Klier, B. B. Muvdi and G. Sachs. Syracuse University. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131034, Mar. 1957, 129 p. $3.25.

(Q26s, L17; ST, SGB-a, *Cd*)

165-Q. Application of a New Structural Index to Compare Titanium Alloys With Other Materials in Airframe Structures. L. R. Jackson and S. A. Gordon. Titanium Metallurgical Laboratory, Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121605, Dec. 1955, 33 p. $1.

Reliable method of evaluating high-temperature performance of materials such as Ti, in comparison with other materials, when only compressible stress-strain curves are available at each temperature.
(Q general, 1-62, T24a; Ti)

166-Q. Flow Properties, Deformation Textures and Slip Systems of Titanium and Titanium Alloys. F. C. Holden, D. N. Williams, W. E. Riley and R. I. Jaffee. Titanium Metallurgical Laboratory, Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121608, Jan. 1956, 102 p. $2.75.

Methods used to predict formability; flow properties for a number of experimental Ti alloys tabulated and compared.
(Q23q, P11g, Q24a; Ti)

167-Q. Antigalling Coatings and Lubricants for Titanium. E. L. White, P. D. Miller and R. S. Peoples. Titanium Metallurgical Laboratory, Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121610, Feb. 1956, 54 p. $1.50.

Wear resistance can be improved by oxide, nitride, and carbide case hardenings and coatings.
(Q9, 18-73; NM-h, Ti)

168-Q. Investigation of the Fatigue Characteristics of Leaded Alloy Steels. G. W. Brock and G. M. Sinclair. University of Illinois for Bureau of Ordnance. *U. S. Office of Technical Services,* PB 121834, Mar. 1957, 57 p. $1.50.

(Q7; AY, *Pb*)

169-Q. Analysis of Dynamic Creep Considering Strain Rate Effects. F. H. Vitovec. University of Minnesota. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131256, May 1957, 21 p. $.75.

(Q3, 3-67)

170-Q. Analytical Methods for Determining Specific Damping Energy Considering Stress Distribution. E. R. Podnieks and B. J. Lazan. University of Minnesota. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131250, June 1957, 42 p. $1.25.

(Q8)

171-Q. Engineering Application of the Absolute Rate Theory to the Creep of Lead. M. B. Hogan. University of Utah. (Office of Naval Research.) *U. S. Office of Technical Services,* PB 121127, May 1955, 83 p. $2.25.

Data from three different published sources were analyzed through the absolute rate theory based on a four-element mechanical model. Metallurgical complexity of Pb and the influence of alloying elements and other factors on its mechanical properties were also examined.
(Q3, 2-60; Pb)

172-Q. Engineering Application of the Absolute Rate Theory to the Creep of Some Aluminum Alloys. M. B. Hogan. University of Utah. (Office of Naval Research.) *U. S. Office of Technical Services,* PB 131139, June 1956, 61 p. $1.75.

Creep data for seven cast and three wrought Al alloys analyzed in terms of a four-element mechanical model and the absolute rate theory. Values of the modulus of elasticity included. (Q3, Q21; Al)

173-Q. An Electronic Signaller to Reduce Quench-Cracking of Steel. L. D. Jaffee, D. C. Buffum and I. L. Preble. Watertown Arsenal Laboratory. *U. S. Office of Technical Services,* PB 131111, June 1952, 38 p. $1.

An instrument which responds with an electrical signal when a steel part being quenched has hardened sufficiently.
(Q29n, J26, 1-53; ST, 9-72)

174-Q. Description of Some Current Methods for Determining Creep Properties Under Compressive Bearing and Shear Type of Loading. E. L. Horne. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131259, June 1957, 32 p. $1.

(Q3, 1-54)

175-Q. Tensile Deformation of Aluminum as a Function of Temperature, Strain Rate and Grain Size. R. P. Carreker, Jr., and W. R. Hibbard, Jr. Wright Air Development Center. *U. S. Office of Technical Services,* PB 121143, July 1955, 27 p. $.75.

(Q27: 2-62, 2-59, 3-68; Al)

176-Q.* Improved Notch Toughness of Experimental Semikilled Steels Over One Inch in Thickness. R. W. Vanderbeck. *Welding Journal,* v. 37, Jan. 1958, 10s-20s.

Test results indicate that a semikilled steel containing about 0.16% C and 1.20% Mn may have sufficient notch toughness to be considered as an emergency substitute, or possibly as an alternate, for ABS Class C killed steel in thicknesses over 1 in. to 1¾ in. inclusive. 12 ref. (Q6n; ST-k)

177-Q.* Preheating — Residual Stresses—Stress Relieving. W. Spraragen. *Welding Journal,* v. 37, Jan. 1958, p. 21s.

Methods of stress relief; comparison of thermal stress-relief treatment with mechanical stress relief treatment. (Q25h, J1a, G23; 7-51)

178-Q.* Fatigue Strength of Silver-Alloy Brazed Joints in Steel. C. H. Chatfield and Sam Tour. *Welding Journal,* v. 37, Jan. 1958, p. 37s-40s.

Laboratory investigation leads to quantitative information regarding the fatigue strength of butt joints in steel brazed with B-Ag-1 Alloy. 4 ref. (Q7a; ST, 7-52)

179-Q. Thermal and Temper Brittleness of Ferritic (Pearlitic) Steels. P. B. Mikhailov-Mikheev. *Metallovedenie i Obrabotka Metallov,* no. 2, Feb. 1956, p. 23-33. (Henry Brutcher Translation no. 3977, Altadena, Calif.)

Previously abstracted from original. See item 421-Q, 1956.
(Q26s, J29; ST, SS)

180-Q. (Russian.) **Method of Steel Testing for Impact Fatigue.** N. F. Vyaznikov and S. S. Ermakov. *Zavodskaya Laboratoria,* v. 23, Sept. 1957, p. 1095-1097.

3 ref. (Q6, Q7, 1-54; ST)

181-Q.* (Spanish.) **Measurement of Internal Stresses in Electrolytic Deposits of Metals.** Francisco Munoz del Corral and Lamberto A. Rubio Felipe. *Instituto del Hierro y del Acero,* v. 10, July-Sept. 1957, p. 355-363.

Experiments designed to prove reproducibility of results in calculation of internal stresses on basis of simple mechanical method. Copper and iron strips were held straight in various types of baths during deposition of Cu, Ni, Cr. One end of strip was then released and allowed to curve freely until reaching equilibrium position. Formula based on radius of curvature, thickness of base metal and thickness of deposit gives internal stress values. 4 ref. (Q25; *Cu, Ni, Cr,* 8-62)

182-Q.* Improved Fabrication Techniques and Lower Cost Favor Titanium's Use. *Corrosion,* v. 14, Jan. 1958, p. 119-122.

Fabrication characteristics of titanium in connection with proposed use for chemical equipment. Principal physical properties of two grades of commercially pure Ti listed and compared with Type 304 stainless steel. Recommendations regarding procedure in welding Ti. 6 ref.
(Q general, K general, 17-57; Ti)

183-Q.* Effect of Heat-Treatment on the Creep and Creep-Rupture Behavior of a High-Purity Alpha Copper Aluminium Alloy at 300 and 500° C. J. P. Dennison. *Institute of Metals, Journal,* v. 85, Dec. 1957, p. 177-181.

Creep and creep-rupture tests have been carried out on a high-purity alpha Cu-Al alloy at 300 and 500° C. Effect of the treatment by which particular grain sizes were achieved, as well as that of actual grain size before testing. At 300° C., where

fine-grained specimens were the most resistance to rupture, and at 500° C., where those having coarse grain sizes gave superior creep-rupture lives, recrystallization at a high temperature during preparation of the specimen resulted in an inferior performance in both creep and creep-rupture tests. 20 ref.
(Q3m, M27c; Cu, Al)

184-Q.* **High Tensile Stainless.** *Iron and Steel,* v. 30, Oct. 1957, p. 487-488.

Data on tensile and other mechanical properties of FV520, a new high-tensile stainless at room and elevated temperatures following various heat treatments. Magnetic properties, electrical resistivity, thermal expansion and other physical properties. The weldable stainless steel is available as forgings, castings, sheet or wire and has composition of 0.07% C, 1.0% Si, 2.0% Mn, 14 to 18% Cr, 4 to 7% Ni, 1 to 3% Cu, 1 to 3% Mo and 0.5% Ti, with the remaining percentage iron.
(Q general, P general; SS, SGB-a)

185-Q. Steels at Elevated Temperatures. J. D. Murray. *Iron and Steel,* v. 30, Oct. 1957, p. 493-495.

Essential properties of high-temperature steels including oxidation resistance, fatigue properties, physical properties influencing thermal stress and creep resistance. Effect of deoxidation practice and mechanical working on creep behavior of steel. (To be concluded.) 9 ref.
(Q general, Q3, 2-62; ST, SGA-h)

186-Q. High-Boron Alloy Steels. T. H. Middleham, J. R. Rait and E. W. Colbeck. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 526-534.

Reviews literature on Fe-B system and alloys. Effects of Fe addition on hot workability of B steels and melting, casting, forging, rolling, extruding and machining of B steels containing Al. Metallographic features of cast B steels with varying Al contents. Data on constitution and mechanical properties of B alloys as determined by microhardness, dilatation, X-ray diffraction and other studies. Welding properties and welding and brazing techniques. (Q general, M24; ST, *B, Al*)

187-Q.* Steels at Elevated Temperatures. J. D. Murray. *Iron and Steel,* v. 30, Nov. 1957, p. 597-601.

Summarizes literature and experimental data concerning influence of metallurgical variables on creep and rupture strength of steel. Solid solution strengthening and precipitation phenomena are considered controlling factors, with transformation products of secondary importance. Methods of obtaining creep data compared; procedure employing constant stress and temperature. 19 ref. (Q3m, 2-62; ST)

188-Q. Micro-Hardness Testing. R. Wall. *Iron and Steel,* v. 30, Nov. 1957, p. 611-612.

8 ref. (Q29q)

189-Q. Plated Finishes. The Choice Widens. Robert T. Gore and Robert M. MacIntosh. *Product Engineering,* v. 28, Oct. 28, 1957, p. 81-84.

Application, corrosion resistance, finish adhesion, hardness, abrasion resistance, ductility and reflectivity of electroplated deposits of single metals or alloys.
(Q general, P17a; 8-62)

190-Q.* (Italian.) **Influence of Heat Treatment on the Fatigue Resistance of Ergal Alloy.** F. Gatto. *Alluminio,* v. 26, Nov. 1957, p. 463-467.

Tests of Al alloy in different heat treat states showed that average fatigue resistance under rotary bending is not appreciably affected by hardening or aging conditions; that variations in resistance are linked to interaction between internal stresses produced during hardening and method of artificial aging. 10 ref. (Q7a, 2-64; Al)

191-Q. (Russian.) **Stable and Unstable Macrolocalization of Plastic Deformation on Static Torsion.** F. P. Rybalko and M. V. Yakutovich. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 450-454.

10 ref. (Q24, Q1)

192-Q. (Russian.) **Study of Nonuniformity of Plastic Deformation on Torsion by Engraved Grids.** T. K. Zilova, N. I. Demina and Ya. B. Fridman. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 455-469.

9 ref. (Q24, Q1)

193-Q.* (Russian.) **Critical Interval of Brittleness of Transformer Steel.** N. I. Lapkin, G. N. Shubin and S. I. Doroshek. *Fizika Metallov i Metallovdenie,* v. 4, no. 3, 1957, p. 478-482.

Plastic properties of steels containing from 1 to 5.8% Si in temperature interval from −80 to 300° C. Determination of critical interval of brittleness in respect to Si content.

Application of low-temperature preheating (100-250° C.) increases ductility of transformer steel 20-fold. 4 ref. (Q23p; Q26s; ST, SGA-r)

194-Q. (Russian.) **Brittle Fracture of Red Copper.** S. K. Maksimov. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 483-489.

Brittleness of Cu at elevated temperatures under dynamic and static loads. 5 ref. (Q26s, 2-62; Cu)

195-Q. (Russian.) **Investigation of State of Strain in Surface Layers of Friction With Sign-Changing Slip.** K. V. Savitskii and Yu. P. Geraskevich. *Fizika Metallov i Metallovedenie,* v. 4, no. 3, 1957, p. 519-526.

Investigation of the character of surface layers and heat stability of Fe, Cu, Al and duraluminum subjected to unidirectional and reciprocal friction. 11 ref.
(Q9p, P11; Al, Cu, Fe)

196-Q. (Russian.) **Influence of Admissible Composition Variations of Soft Sheet Steel Upon Impact Resistance and Aging.** I. E. Brainin and N. V. Gubenko. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 2-4.

Increase of carbon, phosphorus, manganese and sulphur contents decreases impact resistance but has no influence on aging. Increase of silicon contents has no influence on impact resistance but decreases rate of aging. 3 ref.
(Q6, N7a, 2-60, 4-53; ST, *C, Mn, P*)

197-Q. (Russian.) **Wear Resistance of Steel Surfaces Impregnated With Carbide-Forming Elements.** G. I. Dubinin. *Metallovedenie i Obrabotka Metallov,* v. 1, Sept. 1957, p. 21-25. (Henry Brutcher, Altadena, Calif., Translation no. 4015.)

3 ref. (Q9n; ST, 14-68)

198-Q. (Book.) **Creep and Fracture of Metals at High Temperatures.** 419 p. 1957. Philosophical Library Inc., 15 East 40th St., New York 16, N. Y. $12.00.

Proceedings of a symposium held at the National Physical Laboratory, Teddington, England, in May-June 1954. Papers abstracted separately.
(Q3, Q26, 2-62)

199-Q.* **Crystallographic Characteristics of Fracture in Magnesium Single Crystals.** R. E. Reed-Hill and W. D. Robertson. *Acta Metallurgica,* v. 5, Dec. 1957, p. 728-737.

Examination of the fracture mechanism in Mg has been made using single crystals strained in tension parallel to the basal plane. Fracture in a twin (parting) was observed as the primary mode of failure. In the temperature range 25-286° C., fractures occurred primarily in (3034) twins, while at −190° C. the habit plane of fracture was (1124). The low ductility of Mg strained in tension parallel to the basal plane is explained in terms of the fracture mechanism. 9 ref. (Q26, Q23p; Mg, 14-61)

200-Q. The Effect of Pickling and Anodizing on the Fatigue Properties of 2L40 and D.T.D. 683 Aluminium Alloys. J. M. Finney. *Australian Aeronautical Research Laboratories,* Report ARL/SM-255, July 1957, 33 p.

14 ref. (Q7, L12g, L19, 3-70; Al)

201-Q. Better Tests for Brittle Fracture. H. J. Nickols. *Canadian Metalworking,* v. 20, Dec. 1957, p. 34-36.

At present no test meets all requirements needed. Must first decide whether initiation or propagation of brittle fracture is more important in service failures.
(Q26s, 1-54, 2-60; ST)

202-Q.* **Properties of Some Silicon-Molybdenum Steels.** A. S. Kenneford. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 16-22.

Heat treatment and mechanical properties. These steels, owing to their small volume changes on transformation, are resistant to thermal stress-cracking and also show great resistance to softening after tempering up to about 550° C. They also exhibit good ductility and impact value after tempering to give tensile strengths in the neighborhood of 120 tons per sq. in.
(Q general, 2-64; AY, *Si, Mo*)

203-Q.* **Elastic Properties of Yttrium and Eleven of the Rare Earth Elements.** J. F. Smith, C. E. Carlson and F. H. Spedding. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1212-1213. (CMA)

The elastic properties of all the lanthanons were studied except promethium, europium and thulium. Data for sonic velocity, density, elastic moduli (shear and Young's), Poisson's ratio and compressibility are tabulated. Lanthanum, samarium and ytterbium deviate from the linear trend in shear modulus, while Ce and Y deviate from the linear trend in compressibility. Oxygen impurity may explain the behavior of La. 5 ref. (Q21; EG-g)

204-Q.* Temperature Dependence of the Tensile Properties of Vanadium. J. W. Pugh. *Journal of Metals,* v. 9, *AIME Transactions,* vol. 209, Oct. 1957, p. 1243-1244. (CMA)

Arc-melted V ingots were hot rolled and then cold rolled to sheet, from which tensile specimens were cut in the rolling direction. Data on tensile and yield strengths, % elongation, strain-hardening and strain rate sensitivity were obtained at 300, 500, 700, 1000 and 1300° C. The temperature dependence of the tensile properties of V is typical of body-centered cubic metals, and is particularly sensitive at low temperatures. Many phenomena indicate strain-aging behavior. 10 ref. (Q27a, 2-61, N7e; V)

205-Q.* Tensile Deformation of Aluminum as a Function of Temperature, Strain Rate and Grain Size. R. P. Carreker, Jr., and W. R. Hubbard, Jr. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1157-1163.

Investigation of tensile properties of two lots of high-purity Al annealed at different temperatures to produce variations in grain size and tested at temperatures ranging from 20 to 880° K. Relationship of tensile properties to temperature, grain size and strain rate. 21 ref. (Q27, 2-61, 2-59, 3-68; Al)

206-Q.* Some Observations on 855° F. Embrittlement. G. F. Tisinai and C. H. Samans. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1221-1226.

Effects of various preheat treatment, cold rolling, decarburization and nitrogen level on hardening and embrittlement of 24 to 30% Cr steels held at temperatures near 885° F. for 24 hr. Hardness differences found and possible theoretical explanation. 15 ref. (Q26s, Q29n, 2-64; SS, *Cr*)

207-Q.* Sand Cast Magnesium. Rare Earth Metal-Zirconium Alloys. T. E. Leontis and D. H. Feisel. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1245-1252.

Sand castings of Mg alloys containing rare earths and various amounts of Zr following heat treatment were subjected to tensile tests at 70, 400 and 600° F., and 100-hr. creep limits were determined at 400 and 600° F. Effects of Zr, didymium, Ce, mischmetal and Th additions on grain size and mechanical properties. 17 ref. (Q27a, Q3m, 2-61; Mg, *Zr, EG-g*)

208-Q* Notch Tensile Properties of Selected Titanium Alloys. E. P. Klier and N. J. Feola. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1271-1277. (CMA)

Six alloys (Ti-5Al-2.5Sn, Ti-6Al, Ti-7Al-3Mo, Ti-4Al-4Mn, Ti-8Mn and Ti-15Cr) were prepared and contaminated with carbon, oxygen and nitrogen for tensile and notch-tensile testing from 75 down to —320° F. As single or combined contaminants increased, notch sensitivity was induced at a contaminant level which depended on the temperature and, in the notch-tensile tests, on the strength level. The critical strength level was in the 140,000-160,000-psi. range. Contamination limits for producing embrittled conditions were established. 7 ref. (Q27d; Ti)

209-Q.* Creep of Al-Cu Alloys During Age Hardening. Ervin E. Underwood. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1182-1189.

High-purity polycrystalline alloys of Al with 1 to 4% Cu were subjected to creep tests over a temperature range of 200 to 540° C. and hardness, X-ray and tensile tests performed. Creep tests made within both single and two-phase region of the equilibrium diagrams. Effect of aging on minimum creep rate determined. 24 ref. (Q3, N7a, 2-61; Al, *Cu*)

210-Q.* Grain Boundary Deformation in Fine-Grained Electrolytic Magnesium. S. L. Couling and C. S. Roberts. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1252-1256.

Specimens of completely recrystallized extruded electrolytic Mg were tested at 600° F. under stresses of 750, 500, 400 and 300 psi. with additional tests at 500 and 650° F. A grid technique was used in measuring grain boundary displacements. Measurement of grain boundary migration and number of boundary shears enabled calculation of strain localized at grain boundaries. Deformation found to be two-stage process involving alternate boundary shearing and migration. Explained by alternation of anelastic boundary shears with capture of these shears when boundaries migrate to new position. Repetition leads to cyclic process., 28 ref. (Q24m, M27f; Mg)

211-Q. Fatigue Properties of Gray Iron. Franz R. Brotzen and John F. Wallace. *Machine Design,* v. 29, Dec. 12, 1957, p. 154-158.

12 ref. (Q7a; CI-n)

212-Q.* **Zirconium-Tin Alloys.** R. F. Smart. *Metal Industry,* v. 91, Dec. 27, 1957, p. 535-539.

Zr-Sn system; creep resistance; tensile properties, effect of heat treatment on tensile properties; corrosion resistance of Zircaloy 1, 2 and 3; welding of Zr-Sn alloys. 11 ref. (Q general, R general; Zr, *Sn*)

213-Q.* **Measuring Hardness.** R. S. Marriner and F. C. P. Mason. *Metal Industry,* v. 91, Dec. 27, 1957, p. 539-540.

A new deadweight indenting machine, using a 136° pyramid indentor and standard loads of 30, 50, 100 and 120 kgf. has been designed and constructed and is accurate to ±5 D.P.N. units. (Q29, 1-53)

214-Q. **Radioactive-Tracer Technique for Studying Grinding Ball Wear.** M. Pobereskin, N. M. Ewbank, Jr., G. D. Calkins, A. Wesner and J. E. Campbell. *Mining Engineering,* v. 9, *AIME Transactions,* v. 209, Dec. 1957, p. 1356-1358.

6 ref. (Q9p, W15n, 1-59; ST)

215-Q.* **Fatigue Properties of Aluminium Alloys.** G. Forrest. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 831-845.

Review of literature. Fatigue curves for a variety of Al alloys and the effects of heat treatment, work hardening, aging, notched specimen, mean stress, residual stress, surface finish, corrosion and metallurgical factors such as ingot size, grain size, test direction, heat treatment and mechanical working. 37 ref. (Q7a, 3-70; Al)

216-Q.* **Mechanical Testing of Thin Mild-Steel Sheet and Strip.** M. L. Hughes. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 5-18, 22.

Production of cold reduced tinplate stock and its physical properties, together with hardness tests, micro-indentation tests, bend tests, tests for stiffness and "springiness", the "bend factor", variation in sheet springiness, springback, cupping tests, tensile tests and surface finish. (Q general, Q23q; CN, 4-53)

217-Q.* **Micro-Hardness Testing.** R. Wall. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 61-62.

A review of practical experience and a suggested testing procedure. Errors in microhardness testing are generally caused by poor preparation of the test specimen, vibration of the testing machine, careless measurement of impressions and insufficient experience of the operator. (Q29q, 1-54)

218-Q.* **Deformation Studies in Metal Working Processes.** H. P. Tardif. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 626-632, 643-644, 650.

Comprehensive review of experimental and analytical method used to observe deformation of metals; results emphasize production of macro-inhomogeneities and/or micro-inhomogeneities during deformation. Methods which have been used in studying deformation of metals during extrusion, rolling, drawing or tensile loading include reference grids and markers, recrystallization phenomena, tensile strength, hardness, plasticine models, X-ray diffraction and metallographic studies. 127 ref. (Q24, 1-53)

219-Q. **High-Temperature Brittleness in Titanium Alloys.** N. Makrides and W. M. Baldwin, Jr. Case Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131381, June 1957, 29 p. $.75.

Studies of strain aging phenomena, high-temperature brittleness and stress-rupture behavior. (Q26s, Q3m, N7e; Ti)

220-Q. (French.) **Results of Experiments on the Forming of a Bessemer, BTM Steel Made With Oxygen-Enriched Air.** M. Thiault and J. Stremsdoerfer. *Institut de Recherches de la Siderurgie,* Series A, no. 170, Sept. 1957, 107 p.

Operations studied are rolling of sheet and plate for stamping and enameling, manufacture of wire and bolts, and welding. Bessemer steel is as good as openhearth steel for a great number of uses. However, openhearth steel is better for stamping. (Q23q, 17-57; ST-e, ST-g)

221-Q. (French.) **Steels for Pipe at Temperatures Above 600° C.** J. Ivernel. *Revue du Nickel,* v. 23, Sept. 1957, p. 61-71.

Research on the properties of austenitic steels at high temperatures; mechanical tests; experiments on corrosion. 12 ref. (Q general, R general, 2-62; ST, 4-60)

222-Q.* (German.) **Measurements of Internal Friction on Slightly Strained Iron-Carbon Alloys.** W. Wepner. *Acta Metallurgica,* v. 5, Dec. 1957, p. 703-710.

The time dependence of precipitation was investigated in a speci-

men of pure iron to which less than 0.02% C. was added, with or without previous slight deformation up to 5% strain. The undeformed specimen showed the well-known time law of the precipitation of carbide; the specimen strained 5% followed Cottrell's relation for the movement of carbon to dislocations. 12 ref. (Q22, N7, 3-68; Fe, *C*)

223-Q. (German.) **Application of Nodular Cast Iron in Machine Tool Fabrication.** Roland Fervers. *Industrie-Anzeiger,* v. 79, Sept. 24, 1957, p. 3-8.

Superior properties of nodular compared with gray cast iron. 9 ref. (Q general, W25, 17-57; CI-r)

224-Q. (German.) **Wear Behavior of Grinding Wheels.** G. Pahlitzsch and H. O. Erast. *Industrie-Anzeiger,* v. 79, Oct. 4, 1957, p. 1193-1199.

Wear depends upon the cutting speed and the grinding wheel hardness. 10 ref. (Q9, W25-s)

225-Q. (German.) **Notch Tensile Test and Its Application in Predicting Brittle Fracture. Pt. 3.** H. Flössner and K. Matthaes. *Schweizer-Archiv,* v. 23, Sept. 1957, p. 292-304.

65 ref. (Q27d, Q26s)

226-Q.* (Italian.) **Influence of Silicon Content and of the Presence of Manganese on the Properties of G-AS 13 UNI 3047 Alloys.** D. Gualandi. *Alluminio,* v. 26, Dec. 1957, p. 525-535.

Tests on sand and permanent mold castings with and without structural modification caused by salts showed that alloy containing 12% Si and 0.4% Mn had best over-all properties. 5 ref. (Q general, 2-60; Al, *Si, Mn,* 5-60, 5-63)

227-Q. (Japanese.) **Study of Aluminum-Magnesium Alloys Based on Super-Pure Aluminum. Pt. 3.** Yuzo Nakamura, Takuji Okugawa and Noboru Fukuchi. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 34-39.

Earing in deep drawing tests was investigated with alloy sheets containing 99.99% Al. 10 ref. (Q23q, G4b, 1-54; Al, *Mg*)

228-Q. (Japanese.) **Improvement of Heat Resistance of Aluminum Alloys by Addition of Zirconium. Pt. 3.** Yoshitsugu Mishima and Naoaki Takahashi. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 50-54.

Heating tests were carried out on casting alloys with softening behavior compared by measurements of Vickers hardness. (Q29n, 2-60; SGA-h, *Zr,* Al)

229-Q. (Japanese.) **Sintered Aluminum Products.** Masataka Sugiyama and Hisashi Suzuki. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 56-63.

Density, tensile strength, hardness and heat resisting properties of sintered compacts prepared from commercial flake powders and powders produced by atomization. 13 ref. (Q general, P general; Al, 6-72)

230-Q. (Japanese.) **Mechanical Properties of Binary and Ternary Zirconium Alloys.** Yoshitsugu Mishima and Shigeju Morikawa. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 64-69.

3 ref. (Q29n, Q27a, Q5k; SGA-h, Zr)

231-Q. (Russian.) **Summary of 40 Years of Work in Mechanical Testing in the U.S.S.R.** N. N. Davidenkov. *Zavodskaya Laboratoriya,* v. 17, no. 10, 1957, p. 1245-1265.

274 ref. (Q general, 1-54)

232-Q.* **Low-Temperature Deformation of Copper Single Crystals.** T. H. Blewitt, R. R. Coltman and J. K. Redman. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 179-207.

Single crystals of Cu were deformed at 4.2 and 77.3° K. At 4.2° K., after a large strain produced by normal slip, jerky flow, called discontinuous slip, occurs. From the study of reactor-irradiated crystals, it was deduced that a packet of 30 slip lines, each containing 10 dislocations, was released to form each jerk of the discontinuous flow. For samples of certain orientation the region of discontinuous flow was followed by a region of deformation twinning. The fact that deformation twinning was taking place was verified by X-ray methods. 6 ref. (Q24a, Q24b, 2-63; Cu, 14-61)

233-Q.* **Observations on Slip in Aluminum.** T. S. Noggle and James S. Koehler. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 208-214.

Experiments on 99.99% pure Al single crystals. The deformation was performed at helium temperature, at liquid-nitrogen temperature and at room temperature. At helium temperature the curve above 0.1 shear strain is approximately straight; at nitrogen temperature the curve begins to show stage III; at room temperature the entire region seems to be in stage III of work hardening. (Q24a, 2-63; Al-a, 14-61)

234-Q.* Effect of Pressure on the Plastic Deformation of Ni and Al. C. S. Barrett. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 238-240.

Increasing the pressure increases the flow stress. If pressure is decreased, flow stress decreases. There is a slight transient immediately upon reloading after the pressure is changed, but there is clearly a difference in flow stress. In all cases the crystal fractured by necking down; the type of fracture did not change under pressure. (Q24, Q26, 3-74; Al, Ni)

235-Q.* Yield Strength of Binary Alloys. Hideji Suzuki. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 361-390.

Yield strength depends on the interaction force between sources as well as on the force required to tear a dislocation from its locked site. The yield strength determined in experiment is usually the transition point at which the tangent in a stress-strain curve decreases considerably. The yield strength in theory therefore is reasonably determined from the theoretical stress-strain curve. 23 ref. (Q23b, M26b)

236-Q.* Deformation of Alloy Single Crystals. J. Garstone and R. W. K. Honeycombe. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 391-405.

With Al-3.5% Cu crystals, easy glide only occurs in the supersaturated solid solution when deformed at a low temperature, so that aging does not take place during the deformation. If the crystals are aged to peak hardness or overaged, before deformation, then the subsequent stress-strain curve shows normal parabolic hardening. 18 ref. (Q24, N7a; Al, *Cu*)

237-Q.* Yield Points in Al and Ni Single Crystals. C. S. Barrett. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 419-422.

Investigation of the yield points that appear upon reloading after prior plastic deformation and unloading. The yield point appears only if there has been previous plastic flows; the magnitude of the yield point effect increases with the flow stress at the time of unloading; the specimen must be subjected to a reduced load to show the effect. (Q23b, 3-68; Al, Ni, 14-61)

238-Q.* Behavior of Metals Under Reversed Stresses. N. F. Mott. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 458-478.

Current theory of work hardening of metals, especially with reference to their behavior under cyclic stress. A model is proposed which insures that the Frank-Read sources responsible for slip lines should not generate dislocations of the opposite sign with consequent work-softening when the stress is reversed. Model also gives explanation of the existence of fine and coarse slip. Friedel's model of work hardening is extended to explain the formation of multiple slip bands. A theory for the formation of a fatigue crack is proposed. 36 ref. (Q23a, Q24a, M26b)

239-Q.* Deformation and Fracture of Silicon. W. T. Read, Jr., and G. L. Pearson. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 537-544.

Purpose of the investigation was to study the stress-strain behavior of perfect crystals in the plastic range. The mechanism of plastic deformation in Si and the dominant effect of impurities even in the purest Si now available. The behavior is strikingly similar to that of iron containing carbon. There is a pronounced yield point at the beginning of plastic flow, the lower yield stress being less than half the upper yield stress. 8 ref. (Q24, Q26; Si)

240-Q.* (German.) **Fatigue Studies on Bonded Aluminum Structural Parts.** K. F. Hahn and H. D. Steffens. *Aluminium*, v. 33, Dec. 1957, p. 783-788.

Behavior of bonded extruded sections at high loads was studied on fatigue-testing machine (rotating bend) on specimens one meter long. Use of flexible interlayers gives higher fatigue limits than straight bonding or riveting. Prevention of sudden changes in resistance moment under flexures is needed when shaping parts to be bonded. 6 ref. (Q7; Al, 7-58)

241-Q. (German.) **Formation of Twin Crystals and Embrittlement of Steels.** Albert Kochendorfer and Herbert Scholl. *Archiv für das Eisenhüttenwesen*, v. 28, Aug. 1957, p. 483-488.

Microscopic and electron microscopic examinations of impact fractured

specimens show that three kinds of deformation twins exist—"A" twins, wide with irregular boundaries, "B" twins, narrow with smooth parallel boundaries, "C" twins, narrow, smooth and parallel boundaries but submicroscopic. Twin formation is only a secondary phenomenon and does not affect ductility of the material. 20 ref.
(Q24b, Q26s, M21; ST)

242-Q. (German.) **Properties of Steel C45 Under Deformation Processes and as Upsetting and Shearing in Relation to Temperature and Velocity of Deformation.** Werner Lueg and Hans-Günter Mueller. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 505-516.

In temperature range between 700 and 1100° C. the ductility and shear strength of a steel with 0.46% C. was tested and rate of deformation velocity and forces were recorded continuously. Ductility and shear strength correspond to the shape of the resulting curve. Even under elevated temperatures a work hardening process takes place, which can be suppressed or supported by varying deformation velocities. The ductility in relation to the velocity is expressed in an exponential function. For the relation between ductility and shear strength a simplified formula was developed. 12 ref.
(Q23p, Q2g, 2-62; ST)

243-Q. (German.) **Slip Textures on the Surface of Fatigue Tested High-Purity Aluminum.** Max Hempel and Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 547-556.

Multicrystalline high-purity Al was subjected to fatigue tests under various load conditions. Specimens were then investigated under light microscope and electron microscope. Fatigue strength is almost identical with yield strength of annealed Al. Specimens showed more hardening after increasing strain and length of test. Strong grain-boundary slip textures appear, increasing in frequency and variety with increasing length of time and increasing strain. The lower limit for the appearance of slip textures is determined. 20 ref. (Q7, M26c; Al-a)

244-Q. (German.) **Fatigue Testing.** W. Weibull and F. K. G. Odqvist. *Draht,* v. 8, Oct. 1957, p. 429-431.

A report on an international colloquium (International Union of Theoretical and Applied Mechanics) on fatigue testing held in Stockholm in May 1955. The proceedings and speeches were published in book form. (Q7)

245-Q. (German.) **Testing of Thin Sheet by Bending.** H. Cross. *Fertigungstechnik,* v. 7, Sept. 1957, p. 417-420.

New equipment eliminates faults of older methods. 4 ref. (Q5, 1-53)

246-Q.* (German.) **Effect of Hydrogen Content on Mechanical Properties of Converter Steels Blown With Oxygen and Steam.** Alfred Krüger and Eugen Schmidtmann. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1868-1873.

Mechanical properties in normalized, artificially embrittled or rolled condition. Transition temperatures of notch toughness and behavior in subsequent treatment of 20 rimmed or killed steels blown with oxygen and steam. Comparison with rimmed and killed basic bessemer, open-hearth or similar steels blown with oxygen enriched air. 3 ref.
(Q general; ST-g)

247-Q. (German.) **Statistical Analysis of Toughness Tests on Unnotched Impact Bending Test Bars Made From Steels of High Hardness.** Karl Bungardt, Otto Mülders and Wolfgang Spyra. *Stahl und Eisen,* v. 77. Dec. 26, 1957, p. 1878-1883.

10 ref. (Q6, Q29; ST)

248-Q. (Russian.) **Fatigue Strength of Bits Welded Automatically Under Flux.** L. A. Glikman and A. N. Babaev. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 37-43.

Endurance limit of the bits before and after welding. Effect of heat treatment and mechanical working upon endurance limit of welded bits. Decrease in endurance limit of the welded bits expained by deficiency of the welding process. 10 ref.
(Q7k, K1e, T6n)

249-Q. (Russian.) **Method of Measuring Dynamic Hardness of Metals.** E. I. Timofeev and L. A. Urvantsov. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1365-1368.

Device for measuring impact of steel ball on metal. 10 ref.
(Q29b, 1-53)

250-Q. (Russian.) **Measuring Indicators of Strength and Plasticity of Alloys During Crystallization Intervals.** I. I. Novikov and K. T. Matveeva. *Zavodskaya Laboratoriya,* v. 23, no. 11, p. 1369-1372.

New laboratory equipment for studying mechanical properties of alloys at temperatures higher than solidus. 19 ref.
(Q general, X29, 2-62)

251-Q.* Effect of Heat Treatment on the Creep and Creep-Rupture Behavior of a High-Purity Alpha Copper Aluminum Alloy at 300 and 500° C. J. P. Dennison. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 177-181.

Effect of the treatment by which particular grain-sizes were achieved, as well as to effect of actual grain size before testing. At 300° C., where fine-grained specimens were the most resistant to rupture, and at 500° C., where those having coarse grain-sizes gave superior creep-rupture lives, recrystallization at a high temperature during preparation of the specimen resulted in an inferior performance in both creep and creep-rupture tests. 20 ref.
(Q3, 2-59, 2-64; Cu, *Al*)

252-Q. How Good Are Leaded Steels in Fatigue? G. W. Brock and G. M. Sinclair. *Iron Age,* v. 181, Jan. 9, 1958, p. 59-62.
(Q27, Q7, 2-60; ST, *Pb*)

253-Q. New Standard Hardness Testing Machine. R. S. Marriner and F. C. P. Mason. *Machinery,* v. 91, Nov. 22, 1957, p. 1225-1230.

New machine employing a 136° pyramid diamond indenter to calibrate hardness test blocks used in verification of industrial hardness testers. (Q29c, 1-53)

254-Q. Stresses Alter Hardness. S. K. Setty, J. T. Lapsley and E. G. Thomsen. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1127-1129.
(Q29n, Q25, 3-66; ST)

255-Q.* Coefficients of Flat-Surface Friction. A. O. Schmidt and E. J. Weiter. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1130-1136.

Tests conducted on sliding friction between flat surfaces of ground cast iron, scraped cast iron or ground steel and aluminum bronze or cast iron. Effects of lubrication and wear on static coefficient of friction and estimation of kinetic coefficient of friction. 18 ref. (Q9p; CI, ST, Cu)

256-Q. Mechanical Springs—Materials, Finishes and Embrittlement. Lester F. Spencer. *Metal Finishing,* v. 56, Feb. 1958, p. 66-69.

Absorption of hydrogen gas in steel; manner in which this gas will cause damage; conditions under which damage will occur; method by which hydrogen is released during relief treatment. Several theories to explain the action of hydrogen in steel. 13 ref.
(Q26s; ST, SGA-b, *H*)

257-Q.* Niobium, Pt. 2, Properties and Applications. J. H. Rendall. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 7-12.

Mechanical properties; use in atomic energy reactors; columbium in austenitic stainless steel in heat resisting alloys; future outlook. 14 ref. (Q general, W11p, 17-57; Cb, SS, AD-n)

258-Q. Hardness-Tensile Relationship for 7075 Aluminum Alloy. R. E. Kleint and George B. Mathers. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 348-350.

Alloys subjected to a variety of heat treatments to obtain a wide range of mechanical properties.
(Q27a, Q29n; Al)

259-Q. New Aluminum Forging Alloys. Warren Bomhardt. *Product Engineering,* v. 28, Dec. 23, 1957, p. 62-63.

Tensile strength in notched and standard specimen, ductility and corrosion characteristics of 7079 Al alloy compared to 7075 alloy.
(Q general, R general; Al, *Mg, Zn,* 4-51)

260-Q. Drawability of Titanium Defined. *Steel,* v. 141, Dec. 9, 1957, p. 179.

Effects of draw speed, thickness and temperature on drawability of Ti, draw pressure and relation to percentage of draw. (Q23q, G4; Ti)

261-Q. Friction and Wear Under Boundary Lubrication. B. Lunn. *Wear,* v. 1, Aug. 1957, p. 25-31.

Proposes that boundary film is a homogeneous plastic solid with plastic flow, proportional to shear strength of solid. Uses simplified hydrodynamic equations to construct simple diagram of frictional behavior under boundary conditions. Compares diagram to technical experience. 11 ref. (Q9p, 14-62)

262-Q. Wear of Cast Iron Machine Tool Slides, Shears and Guideways. H. T. Angus. *Wear,* v. 1, Aug. 1957, p. 40-57.
(Q9, W25; CI)

263-Q. Thermal Aspects of Galling of Dry Metallic Surfaces in Sliding Contact. Frederick F. Ling and Edward Saibel. *Wear,* v. 1, Oct. 1957, p. 80-91.
(Q9p, Q9q)

264-Q. Experiments on the Friction and Endurance of Various Surface

Treatments Lubricated With Molybdenum Disulphide. A. A. Milne. *Wear,* v. 1, Oct. 1957, p. 92-103.

Phosphated and sulphided mild steel surfaces in association with different molybdenum disulphide formulations were rotated in contact and results presented in form of comparative data on friction and endurance. 9 ref.
(Q9n, Q9p; ST, NM-h)

265-Q. Wear in Cylinder Liners. K. Fursund. *Wear,* v. 1, Oct. 1957, p. 104-118.
(Q9, W11j)

266-Q. Survey of Possible Wear Mechanisms. John T. Burwell, Jr. *Wear,* v. 1, Oct. 1957, p. 119-141.
10 ref. (Q9)

267-Q. Fatigue Failures in Fatigue Machines. W. H. Munse. *Welding Journal,* v. 37, Feb. 1958, p. 54s-56s.

Welded flexural members subjected to many millions of cycles of loading may fail at relatively low maximum nominal stresses. (Q7)

268-Q. (English.) **Creep of Metals.** N. P. Allen. *Teknisk Ukeblad,* v. 104, Sept. 26, 1957, p. 779-787.

The way in which creep takes place and factors influencing rate of deformation; development of alloys specially resistant to creep at high temperatures. (Q3)

269-Q.* (French.) **Welded Joints of Ferritic and Austenitic Steels: Their Use in Heating Plants.** F. Zimmer. *Revue de la Mécanique,* v. 3, Oct. 1957, p. 162-174.

Because of the diverse physical and metallurgical characteristics of these steels, joints are subject to severe strains due to different coefficients of expansion; to decarburization of the ferritic steel; to corrosion fatigue in decarburized zone. Ten types of joints in which transition metals and other methods are used to reduce these harmful phenomena. (Q25, P12g, 2-60; SS, 7-51)

270-Q. (Japanese.) **Experimental Study on Static Strength of Perforated Strips and Riveted Joints of Commercially Pure Titanium.** Shoji Shimamura and Yusei Noguchi. *Journal of Mechanical Laboratory,* v. 11, Nov. 1957, p. 194-203.

Nine groups of specimens were tested under static tensile load to determine effect of ratio of hole diameter to plate width. 8 ref.
(Q27; Ti)

271-Q. (Russian.) **Influence of Phosphorus Content Upon Wear and Friction of Gray Cast Iron.** A. A. Olshevskii and M. M. Kantor. *Liteinoe Proizvodstvo,* July 1957, p. 14.
(Q9, 2-60; CI-n, P)

272-Q. (Russian.) **Fatigue Tests for Gear Wheels.** V. I. Rudnitskii. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1383-1384.

Various factors affecting fatigue strength of gear wheels during bending. (Q7, T7a)

273-Q. (Spanish.) **Fatigue in Automotive Parts.** J. Garcia Martin. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec, 1957, 16 p.

Role of part design, choice of metal, heat treatment and coatings in reducing fatigue tendencies. Fatigue in crankshafts, bearings, bolts, pins, springs and gears. 8 ref. (Q7, T21c)

274-Q. How Ceramics Help Metals Beat Heat Barrier. William Beller. *American Aviation,* v. 21, Dec. 16, 1957, p. 43-44.

Ceramic coatings increase heat resistance. (Q general, 2-62; 8-71)

275-Q. Stresses After Hardness. S. K. Setty, J. T. Lapsley and E. G. Thomsen. *ASME Paper No. 57-A-77,* Dec. 1957, 3 p.

Results of hardness tests on metal specimens subjected to uniform and gradient stresses. Materials became softer under tension, harden under compression. 5 ref. (Q29, 3-66)

276-Q. Program for the Appraisal of the Tendency of Brittle Fracture in Steel Forgings. A. O. Schaefer. *ASME Paper No. 57-A-262,* Dec. 1957, 6 p.
(Q26s, 5-51; ST)

277-Q. Creep Design Workshop. *ASME Paper No. 57-A-286,* Dec. 1957, 12 p.

Creep-rupture data, creep design and service life. (Q3, 17-51)

278-Q. Mechanical and Physical Characteristics of Jewelry Bronze, 87-5% Strip. Delmar E. Trout. *ASTM Bulletin,* no. 227, Jan. 1958, p. 45-50.
(Q general, P general, T9s; Cu-s, 4-53)

279-Q. Effect of Loading Rate on Adhesive Strength. Frank Moser and Sandra S. Knoell. *ASTM Bulletin,* no. 227, Jan. 1958, p. 60-63.

Results show significant differences between loading rates, testing machines and adhesives.
(Q10c, 3-67, 1-54; NM-d34)

280-Q. A Recording Torsion Testing Machine for Wire. H. C. Burnett. *ASTM Bulletin,* no. 227, Jan. 1958, p. 68-69.

(Q1, 2-53; 5-61)

281-Q.* Impact Fatigue Resistance of Structural Steels. B. N. Das and G. D. Sani. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 103-118.

Studies made by using transverse impact stressing on rotating unnotched test pieces. Curves showing the kinetic energy versus number of impacts exhibit the characteristic of S-N curves, indicating a limiting value of K. E., that is, a definite endurance limit under impact. Criterion for failure under repeated transverse impact was determined by an electrical resistance gage and measuring units. 16 ref. (Q7a, Q6p; ST, SGB-s)

282-Q.* Inhomogeneous Deformation in Polycrystalline Metals. R. C. Deshpande. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 131-137.

Test specimens of commercial Al containing only few grains were deformed in tension and microhardness determinations made within grains and near grain boundaries. Local deformations measured; elongations of different portions of each grain determined; elongation varies in different grains and deformation not uniform; tendency to conform in elongation at grain boundaries, and nearly minimum near junction of three grains. 9 ref. (Q24, M27c)

283-Q. Investigation of the Compressive Strength and Creep Lifetime of 2024-T3 Aluminum-Alloy Plates at Elevated Temperatures. Eldon E. Mathauser and William D. Deveikis. *National Advisory Committee for Aeronautics,* Report 308, 1957, 14 p.

8 ref. (Q3, Q28; Al, 4-53)

284-Q. Elastic Deformation and the Laws of Friction. J. F. Archard. *Royal Society, Proceedings,* v. 243, Dec. 24, 1957, p. 190-205.

An examination as to whether the hypothesis of elastic deformation of surface protuberances is consistent with Amonton's law (that the friction is proportional to the applied load). Experiments show that the friction is porportional to the true area of contact; whether or not Amonton's law is obeyed depends upon the surface topography. 19 ref. (Q9q, Q21)

285-Q. Brittleness of Ferro-Chrome-Aluminium Resistance Alloys. *Wire Production,* v. 6, Oct. 1957, p. 14-15. (Q26s; Fe, Cr, Al, SGA-q)

286-Q. (German.) **Testing of Heat Resistant Powder Metal Materials.** F. Eisenkolb and W. Schatt. *Die Technik,* v. 12, Dec. 1957, p. 824-828.

Cermets consisting of clay with 10 to 90% Cr chromium tested for specific gravity, bending break strength, tensile strength, hardness, bending strength under impact, electric resistance and texture. 7 ref. (Q general, P general; SGA-h, 6-70)

287-Q. (German.) **Properties of Metal Melts. Pt. 13. The Internal Friction of Bismuth.** Erich Gebhardt and Konrad Köstlin. *Zeitschrift für Metallkunde,* v. 48, Nov. 1957, p. 601-602.

Measurements of internal friction at temperatures up to 600°. No influence of short range ordering on internal friction. (Q22, N10, 2-61; Bi)

288-Q. Method for Studying the Behavior of Cutting Fluids in Wear of Tool Materials. L. V. Colwell. *American Society of Mechanical Engineers,* Paper no. 57-A—160, May 1957, 5 p.

4 ref. (Q9p; SGA-j, NM-h)

289-Q. Croloy 15-15N. Austenitic Heat-Resistant Alloy for Severe Tubular Applications at Elevated Temperatures. J. F. Ewing. *American Society of Mechanical Engineers,* Paper no. 57-A—205, Dec. 1957, 10 p.

(Q-general, 17-57; SS, SGA-h, 4-60)

290-Q. Prediction of Creep in Bending From Tension and Compression Creep Data When Creep Coefficients Are Unequal. W. N. Findley, J. J. Poczatek and P. N. Mathur. *American Society of Mechanical Engineers,* Paper no. 57-A—213, Dec. 1957, 20 p.

14 ref. (Q3)

291-Q. Micro-Hardness Testing. R. Wall. *Atomics and Nuclear Energy,* v. 9, Jan. 1958, p. 22-23.

(Q29q)

292-Q. Creep Tests on Materials for Gas-Cooled Reactors. *Atomics and Nuclear Energy,* v. 9, Jan. 1958, p. 26.

New equipment designed to provide creep and stress-rupture data on metals and alloys in gaseous atmospheres or high temperatures and pressures. (Q3, 1-53, T11, 17-57)

293-Q. Effect of Heat Treatment on Low Temperature Internal Friction Maxima. T. S. Hutchison and G. J. Hutton. *Canadian Journal of Physics,* v. 36, Jan. 1958, p. 82-87.

9 ref. (Q22, 2-64; Al)

294-Q.* Metallography of Low-Carbon Bainitic Steels. K. J. Irvine and F. B. Pickering. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 101-112.

A relationship has been obtained between tensile strength or transformation temperature and the structural features. At high transformation temperatures (the lower tensile-strength level), the strength is largely controlled by grain size and, as the transformation temperature decreases, the grain size decreases and the tensile strength increases. At low transformation temperatures (the high tensile-strength level), although grain size is very fine, there is an increasing strengthening effect due to the dispersion hardening effect of the carbide particles. 13 ref. (Q27a, 2-59, N8m; CN-g)

295-Q. Recent Advances in Cermets. Robert Steinitz. *Jet Propulsion,* v. 28, Jan. 1958, p. 15, 68-70.

Why cermets behave as they do; impact resistance and ductility. 18 ref. (Q-general, M27; 6-70)

296-Q. On Rigid Work-Hardening Solids With Singular Yield Conditions. W. E. Boyce and W. Prager. *Journal of Mechanics and Physics of Solids,* v. 6, no. 1, 1957, p. 1-12.

Uniqueness theorems and extremum principles in light of increased use of singular yield conditions in recent work on plastic disks, plates and shells. 4 ref. (Q23a)

297-Q. Fatigue Crack Propagation in Torsion. J. A. H. Hult. *Journal of Mechanics and Physics of Solids,* v. 6. no. 1, 1957, p. 47-52.

5 ref. (Q7h, 9-72)

298-Q. Effect of Impact Loading on the Static Yield Strength of a Medium-Carbon Steel. J. D. Campbell and C. J. Maiden. *Journal of Mechanics and Physics of Solids,* v. 6, no. 1, 1957, p. 53-62.

8 ref. (Q6, Q23b; CN-p)

299-Q. Associated Flow Rule of Plasticity. D. R. Bland. *Journal of Mechanics and Physics of Solids,* v. 6, no. 1, 1957, p. 71-78.

The flow rule at singular points on a yield surface is found by considering the actual yield surface as the limit of a sequence of regular surfaces. Confirms the work-hardening and linearity hypothesis of Drucker. 10 ref. (Q23a, Q24)

300-Q. Elastic-Plastic Torsion of Sharply Notched Bars. J. A. H. Hult. *Journal of Mechanics and Physics of Solids,* v. 6, no. 1, 1957, p. 79-82.

The shape of the incipient plastic region at the tip of a sharp notch in a twisted bar is derived, assuming the material to be ideally plastic. The result is used to determine the strain in the plastic region. 5 ref. (Q1d)

301-Q.* New Alumina-Type Cermets. Thomas F. Frangos. *Materials in Design Engineering,* v. 47, Feb. 1958, p. 112-115.

Three types of cermets having alumina as the ceramic phase have been developed: chromium-alumina (LT-1); molybdenum-chromium-alumina (LT-1b); tungsten-chromium-alumina (LT-2). High-temperature strength, erosion and wear resistance, oxidation resistance, resistance to molten metals.
(Q-general, 1-62, R6m; 6-70)

302-Q.* Vacuum Cast Nickel Alloy Versus 'Best' Cobalt Alloy. J. J. Eisenhauer and John Preston. *Materials in Design Engineering,* v. 47, Feb. 1958, p. 116-117.

At 1200° F., the vacuum cast Ni-base alloy, Udimet 500, has three times the tensile strength of arc-cast AMS 5382, generally considered the best available Co-base high-temperature alloy. Under the same conditions of stress and service life, the operating temperature can be raised from 1525 to 1700° F. by substituting the Ni alloy, now commercially available, for the Co alloy.
(Q27a, 2-62, E-general, 1-73; SGA-h, Ni, Co)

303-Q.* Stronger Aluminum Casting Alloys. F. H. Smith. *Metallurgia,* v. 47, Feb. 1958, p. 64-70.

Demand for two types of strong Al casting alloy; in one, proof stress is regarded as more important than ductility and, in the other, the reverse. Alloys of Al with Cu, Mg, Zn and Mg, Si and Mg. It should be possible, by reducing the iron content of alloy LM 8 to about 0.15%, and by appropriate selection of Mg content and heat treatment, to produce stronger or, alternatively, tougher castings. 18 ref.
(Q27a, Q23p, 2-60, 2-64; Al, 5-60)

304-Q. Effect of Environments of Sodium Hydroxide, Air, and Argon on the Stress-Rupture Properties of Nickel at 1500° F. Howard T. McHenry and H. B. Probst. *National Advisory Committee for Aeronautics, Technical Note 3987,* Jan. 1958, 23 p.

13 ref. (Q3m, 2-62, 2-66; Ni)

305-Q. Strength of Welds in Carbon Steel. *Petroleum,* v. 21, Feb. 1958, p. 55-58.

51 ref. (Q27a, Q3m; CN, 7-51)

306-Q. (Hungarian.) **Impact Resistance of Steel Castings.** Zoltan Nagy. *Kohaszati Lapok,* v. 12, July 1957, p. 149-157.

(Q6; ST, 5-60)

307-Q. (Hungarian.) **Notes on Wear of Machine Tool Castings.** Miklos Cseh and Andor Gaal. *Kohaszati Lapok,* v. 12, July 1957, p. 163-171.

Service tests. 13 ref.
(Q9, W25, 17-57)

308-Q. (Swedish.) **Scatter in Strength of Light Alloy Castings.** F. Turner. *Gjuteriet,* v. 47, Dec. 1957, p. 204-206, 207-210.

Analysis of routine test results indicates different alloys should have different safety factors. 6 ref.
(Q-general, S12; T24; Mg, Al)

309-Q.* Effect of Different Surface Treatments on the Fatigue Strength of Drill Steel. T. W. Wlodek. *Canadian Mining and Metallurgical Bulletin,* v. 51, Feb. 1958, p. 89-101.

Effects of shot peening, induction surface hardening, spiral rolling, singly and in combination, on fatigue strength of SAE 1080 and Ni-Cr-Mo steels. Spiral rolling results in greatest improvement. Expected range and distribution of stresses during actual operations are estimated and mechanism of failure is analyzed. 26 ref. (Q7, 3-70, G23s; CN, AY, TS)

310-Q. How to Measure the Effects of Slack-Quenching. *Iron Age,* v. 181, Jan. 23, 1958, p. 80-82.

Impact test of steels shows uniformity of hardness and microstructure in any plane above immersion level and parallel to quenched end.
(Q6, J26n, ST)

311-Q.* Fracture of Metals. W. D. Biggs. *Iron and Steel,* v. 31, Feb. 1958, p. 57-60.

Review of the current theoretical explanations of crack initiation and propagation. Relationship between fracture stress, yield stress and grain size: influence of oxygen and yield delay on fracture stress. 42 ref.
(Q26)

312-Q.* Internal Friction. P. M. Robinson and R. Rawlings. *Iron and Steel,* v. 31, Feb. 1958, p. 65-68.

Using the linear relationships between the percent nitrogen and percent carbon in solid solution and the internal friction peak, the solubility of carbon and nitrogen in alpha iron at various temperatures is determined. The height of the internal friction peak is determined only by the quantity of solute in solid solution and is independent of the condition or size of the precipitate particles. Summary of work done using the internal friction measurement process. 60 ref. (Q22, N12p)

313-Q.* (French.) **Influence of Heat Treatment in Hydrogen Atmosphere on Properties of Binary Alloys of Magnesium and Zirconium.** Jean Herenguel, Jacques Boghen and Pierre Lelong. *Comptes Rendus,* v. 245, Dec. 16, 1957, p. 2272-2275.

Wrought alloy specimens containing from 0.20 to 0.57% Zr were treated in hydrogen atmosphere between 400 and 500° C.; reference specimens were treated in carbon dioxide and argon atmospheres; exposure times ranged up to 1000 hr. Mechanical properties were then measured at ordinary and high temperatures (200-500° C.) and endurance under given stress, contraction of cross section and distributed elongation after rupture were recorded. Structures were studied by micrography and tests made to determine respective percentages of soluble and insoluble zirconium.
(Q-general, J2k; Mg, *Zr*)

314-Q.* (French.) **New Research on Refractory Vanadium Steels.** A. Roos. *Metallurgie et la Construction Mécanique,* v. 90, Jan. 1958, p. 11-13.

Study undertaken to verify hypothesis that part of Mo content of refractory steels can be replaced by V, and to improve mechanical strength of these steels at high temperature. Vanadium tends to increase strength and to retard appearance of third (fastest) phase of creep. Equal refractoriness can be obtained by compositions containing less Mo and more V, provided proper normalizing heat treatment is given.
(Q27a, Q3, 2-62, 2-60; AY, *V,* SGB-q)

315-Q.* (German.) **Use, Manufacture and Heat Treatment of Cast Alloy Steel Rolls. Pt. 1. Stresses Heat Treating and Their Calculation.** Heinz Uhlitzsch and Gerhard Radomski. *Neue Hütte,* v. 2, Nov. 1957, p. 655-664.

Calculation of surface and core temperature and their temperature difference; compensating temperature and temperature difference across the section. 6 ref.
(Q25m, J-general. W23k; ST, 5-60)

316-Q. (Hungarian.) **Effect of Titanium on the Properties of Carburizing Steels.** Nandor Hajto. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 3-14.

New types of Mg steel alloyed with Ti. 8 ref.
(Q-general, J28g; AY, *Mn, Ti*)

317-Q. (Italian.) **High-Temperature Alloys.** *Nickel,* no. 71, Dec. 1957, p. 1-12.

Properties to be considered in choice of heat resistant materials; metallic materials for high-temperature service and their properties. Covers cast iron, some wrought stainless steels, heat resisting casting alloys and superalloys.
(Q-general, 2-62; SGA-h, CI, SS)

318-Q.* **High-Temperature Strength of Alloys of Some Binary, Ternary, Quaternary, and Quinary Nickel Systems at 800°.** I. I. Kornilov and L. I. Pryakhina. *Academy of Sciences of the USSR, Proceedings, Chemistry Section,* v. 112, Jan-Feb. 1957, p. 5-7. (Translated by Consultants Bureau, Inc.)

Chromium, tungsten, titanium and aluminum were found to strengthen nickel by forming limited solid solutions of considerable concentration. Maximum strengthening is attained in regions of completely saturated and supersaturated solid solutions. 6 ref. (Q-general, N12p, 2-60, 2-62; Ni, *Al, Cr, Ti, W*)

319-Q.* **Fatigue Failures.** V. C. Young. *Eaton Engineering Forum,* v. 18, Dec. 1957, p. 2-8.

Basic causes of fatigue failure in internal combustion engine valves. Failures in neck or blend area are usually result of overstressing; lock groove areas fail because of high value seating velocities; head area failures are due to excessive operating temperature, excessive temperature gradients, overstressing from gas loading or mechanical high seating velocities combined with temperature. Methods for combatting each type of failure. (Q7, T7b)

320-Q. **Impact and Fatigue Properties of Ductile Cast Iron.** Charles F. Walton. *Machine Design,* v. 30, Jan. 1958, p. 128-131.

Influence of structure, composition, heat treatment on impact properties; fatigue strength, notch sensitivity, effects of surface finish on endurance limit. 6 ref.
(Q6n, Q7a; CI-r)

321-Q.* (German.) **Development of Macrohardness Recorder.** R. Böklen. *Werkstattstechnik und Maschinenbau,* v. 47, Nov. 1957, p. 627-630.

Experiments with a hardness recorder which marks force depth curve. Real hardness course can be most correctly determined with a penetrating body as sharp as possible. Force depth curve gives very precise permanent and objective results. (Q29, 1-53)

322-Q.* (Japanese.) **Properties of Cast Iron.** Kisao Abe. *Casting Institute of Japan, Journal,* v. 29, Dec. 1957, p. 846-853.

High-grade cast iron made with large amounts of steel scrap and with proper inoculation is superior to steel in compressive strength and acid resistance. It may be equal to steel in tensile strength, shock, fatigue and rust resistance. Tendencies toward increasing nitrogen and decreasing oxygen increase with higher percentage of steel scrap.
(Q-general; CI, RM-p)

323-Q. **Back Twist in the Manufacture of Wire Rope.** Joseph Regensburger, Jr. *Draht (English Edition),* no. 32, Dec. 1957, p. 11-15.

Change of properties of wire rope caused by variations of twist and back twist. Diagrams and mathematical formulas. (Q1, K13a, T7g)

324-Q.* **Softening of Cold Worked Metal by Alternating Strain.** W. A. Wood and R. L. Segall. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 225-228.

Measurements of the proof stresses required to impose successive reversals of plastic strain on specimens of cold worked Cu, Ni and Al subjected to alternating torsion tests. Further strain hardening occurs as the first reversals are applied but this hardening soon reaches a peak which is followed by softening. The latter is the more marked as the preliminary cold working is heavier and the plastic amplitude smaller. 9 ref. (Q23a, Q1; Cu, Ni, Al)

325-Q.* **Cracking of Mercury-Coated Alpha-Brass Under Alternating Strain.** W. A. Wood. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 228-231.

The phenomenon of mercury-cracking is utilized to determine how effective different amplitudes may be in building up local internal stresses, and so to test theories which attribute fatigue failure to

local development of high stresses. The effectiveness of the alternating strain decreases sharply below a particular range of amplitudes, and as a result of this and related effects it is suggested that two mechanisms of fracture exist, one for large amplitudes and one for small. (Q7, Q26)

326-Q.* Extrapolation of the Stress-Rupture Properties of the Nimonic Alloys. W. Betteridge. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 232-237.

Four methods proposed for the extrapolation of the stress-rupture properties of high-temperature alloys are compared with regard to their application to the Ni-base alloys Nimonic 80A and Nimonic 90. The best results were obtained by using a time-temperature parameter. 7 ref. (Q3q; Ni, SGA-h)

327-Q.* Wear of Metals. F. T. Barwell. *Institute of Metals, Journal,* v. 86, Feb. 1958, p. 257-269.

Mechanism of wear. Wear conditions, such as rolling contact, scuffing, fretting corrosion and the effect of oxygen on friction and surface damage during simple sliding. (Q9n)

328-Q.* Interaction Between Slip Bands and Particles of Precipitate in an Aluminium Alloy. Shigeyasu Kodo and Taro Takeyama. *Institute of Metals, Journal,* v. 86, Feb. 1958, p. 277-280.

Alloy was aged at 250° C. to a point just beyond the hardness maximum. After heat treatment the alloy was stretched by 1-2%. Slip bands were short and of the lamellar type, and platelets in their path were bent. Similar bending was observed on specimens taken from the interior of the alloy, suggesting that slip phenomena in the interior are similar to those on the surface. (Q24c, N7a; Al)

329-Q.* Further Observations on the Ductility of Chromium. H. L. Wain, F. Henderson, S. T. M. Johnstone and N. Louat. *Institute of Metals, Journal,* v. 86, Feb. 1958, p. 281-288.

Nitrogen, present as an impurity, can raise the ductile-brittle transition of cold rolled Cr by at least 300° C., but oxygen in the range 0.01-0.06% produces no marked or consistent effect. Evidence for Cottrell locking in Cr is advanced, particularly in respect of the temperature-dependence of yield stress and brittle fracture stress. (Q23p, Q23r, 3-69; Cr)

330-Q.* Relationship Between Scleroscope, Rockwell, and Brinell Hardness Readings. N. R. Arant and J. J. Marsalka. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 160-161.

Controlled series of hardness tests were conducted on chill iron, grain iron and carbon steel, resulting in a table for converting from C-2 Scleroscope to Rockwell hardness values and vice versa. (Q29e)

331-Q. Russian Research on Lubrication and Wear. Douglas Godfrey. *Lubrication Engineering,* v. 14, Jan. 1958, p. 27-31.

Kinetics of lubricant additive; action and use of radioactive isotopes of sulphur and phosphorus to measure amount of film formed. 11 ref. (Q9, 1-59, 18-73, NM-h)

332-Q.* Surface Fatigue of Carbonitrided Steel. G. W. Powell, M. B. Bever and C. F. Floe. *Metal Progress,* v. 73, Mar. 1958, p. 67-69.

The pitting of worn carbo-nitrided surfaces is shown to be related to case depth and amount of retained austenite. Performance of carburized surfaces, run in conjunction, indicates case depth to be the prime factor. (Q7, Q9, J28m; ST)

333-Q.* Improvement in High-Temperature Alloys by Boron and Zirconium. W. J. Pennington. *Metal Progress,* v. 73, Mar. 1958, p. 82-86.

While most tramp elements have been regarded as detrimental to high-temperature alloys, it is found that additions of 0.01% B and 0.10% Zr (or both), usefully reduce the tendency to notch brittleness at service temperatures and improve rupture strength. (Q3m, Q26s, 2-60; SGA-h, Fe, Ni, Co, *Zr, B*)

334-Q. What's Happened to Cermets. J. W. Graham and W. F. Zimmerman. *Metal Progress,* v. 73, Mar. 1958, p. 89-91.

Originally intended for jet engine parts, cermets have become useful in other fields. Their resistance to corrosive liquid metals and acids makes them valuable for pump seals in rockets and nuclear plants. (Q-general, T2p, T11, 17-57; 6-70)

335-Q. Effect of Temperature on Rolling-Contact Fatigue Life With Liquid and Dry Powder Lubricants. Thomas L. Carter. *National Advisory Committee for Aeronautics, Technical Note 4163,* Jan. 1958, 40 p.

Life of AISI M-1 toolsteel decreases with increasing temperature. 10 ref. (Q7b, 2-61; TS, NM-h)

336-Q. Ultrasonic Absorption in Metals. A. I. Akhiezer, M. I. Kaganov and G. Ia. Liubavskii. *Soviet Physics-JEPT*, v. 5, Nov. 1957, p. 685-688. (Translation by American Institute of Physics.)

4 ref. (Q21f)

337-Q.* The Minimum Bend Radii of Aluminum Alloy Tubes. D. A. Barlow. *Welding and Metal Fabrication*, v. 26, Mar. 1958, p. 90-95, 110.

Tests on tubing of various hardnesses and ratios of outside diameter to wall thickness. (Q5g; Al, 4-60)

338-Q. (French.) **New Anti-Wear Coating.** Felix Barbas. *Machine Moderne*, v. 52, Jan. 1958, p. 21-25.

Tests of Pb-Mo sulphide coatings. (Q9p; Mo, Pb; NM-h)

339-Q. (French.) **Possibilities of Modern Castings.** Jean Gonin and Gerard de Smet. *Machine Moderne*, v. 52, Jan. 1958, p. 57-65.

State of development of special castings; Ni-Resist, Ni-Hard, austenitic Ni-Cr-Mo, pearlitic, phosphoritic and others. (Concluded.) (Q-general, E-general; Ni, SS, SGA-h, 5)

340-Q. (French.) **Kinematic Aspects of Fracture.** J. Leeuwerik. *Métaux Corrosion Industries*, v. 32, Nov. 1957, p. 443-457.

Study of fracture causes and propagation by means of geometric fracture figures; new ultrasonic methods; treatment of different materials; increasing fracture resistance. 20 ref. (Q26)

341-Q.* (German.) **Tensile Strength of Aluminum Sand Castings Cast From Remelted Alloys.** Hans Reininger. *Giesserei-Praxis*, no. 4, Feb. 25, 1958, p. 57-69.

Composition of seven alloys and technique of test casting. Measurements on untreated and treated (chlorinated) specimens. Relationship between tensile strength, breaking tension and chlorine treatment. (Q27a, 2-60; Al, 5-60)

342-Q.* (German.) **Classification of Steel Structures From the Point of View of Their Resistance to Brittle Fracture.** K. Rühl. *Schweissen und Schneiden*, v. 10, Feb. 1958, p. 39-44.

New German standard (DIN 17.000) and advice of German Committee for Steel Construction for classification of steel quality; transition temperature as a criterion for safety against brittle fracture; deformation values (stretching, necking, bending angle) cannot be used as criteria because it is impossible to reduce the variables to one simple value. (Q26s, Q23r; ST, SGA-s)

343-Q. (German.) **Problem of Brittle Fracture of Steel.** W. Felix and T. Geiger. *Schweisstechnik*, v. 11, Dec. 1957, p. 158-162.

Examination of deformation state of crystals by X-ray (back-reflection method). Correlation between crystal orientation, microhardness and deformation behavior. (Q26s; ST)

344-Q. (German.) **Properties of Metal Melts. Pt. 14. Internal Friction of Lead-Tin and Lead-Antimony Alloys.** E. Gebhardt and K. Kostlin. *Zeitschrift für Metallkunde*, v. 48, Dec. 1957, p. 636-641.

(Q22, P10f; Pb, *Sn*, *Sb*)

345-Q.* (German.) **Transient Creep in Face-Centered Cubic Metal Crystals.** Hubert Blanck. *Zeitschrift für Metallkunde*, v. 49, Jan. 1958, p. 27-39.

Experimental technique with a new interference optical apparatus. Evaluation of results. Creep behavior at various temperatures. Quantitative correlation to stress-strain curve. 22 ref. (Q3; Al, Cu, Ni)

346-Q. (German.) **Deformation Anisotropy of Ordered Solid Solutions.** Hans-Joachim Bunge. *Zeitschrift für Metallkunde*, v. 49, Jan. 1958, p. 40-42.

8 ref. (Q24g; 14-67)

347-Q.* (German.) **Resistance to Upsetting by Zinc and Zinc Alloys.** Erich Pelzel. *Zeitschrift für Metallkunde*, v. 49, Jan. 1958, p. 47-52.

Resistance to upsetting in relation to orientation of crystallites. Influence of soluble and insoluble additions. 12 ref. (Q24, F22j; Zn)

348-Q.* (Italian.) **Properties of Bronze Test Bars.** Ernesto Bosio. *Fonderia Italiana*, v. 7, Jan. 1958, p. 9-12.

Tests to determine influence of feeding system, pouring temperature and degassing of molten metal on ultimate strength and per cent elongation. (Q27a, E23; Cu-s)

349-Q.* (Italian.) **Some Aspects of the Hot Working of Magnesium and Magnesium-Base Alloys.** G. Tosatto. *Metallurgia Italiana*, v. 49, Dec. 1957, p. 817-824.

Experimental hot rolling, extrusion and forging and subsequent testing

revealed influence of prior annealing, working temperature and speed, percentage of reduction and other factors on mechanical characteristics of products obtained. 4 ref. (Q-general, F22, F23, F24, 1-66; Mg)

350-Q.* (Portuguese.) **Brittle Fracture in Automotive Suspension Springs.** Alberto A. Arantes, Michael L. Pinkuss and Francisco P. do Canto. *ABM, Boletim da Associacao Brasileira de Metais,* v. 13, Oct. 1957, p. 319-327.

Study of springs made of Brazilian steels and steels from other countries leads to conclusion that principal cause of brittle fracture of springs in vehicles in service in Brazil is condition of roads in that country. Use of more resilient, tougher steels is recommended. 10 ref. (Q26; ST, SGA-b)

351-Q.* (Russian.) **Nature of Critical Degree of Deformation.** Y. R. Rauzin and A. R. Zheleznyakova. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 41-48.

Recrystallization of metals after minor deformation is little studied. Rapid grain growth during heat treatment is associated with initial state of deformation. This state is characterized by intergrain transfer in polycrystalline metals such as Al. Critical interval appears during slow deformation. Active forces wedge and dislodge grains which become distorted. New grains are formed during subsequent heating. 7 ref. (Q24, N5)

352-Q. (Russian.) **Effect of Deep Anodizing on the Fatigue Resistance of Aluminum Alloys AK-4 and VD-17.** A. S. Nikishov, G. V. Kurganov and N. I. Yarzhemskaya. *Metallovednie i Obrabotka Metallov,* Dec. 1957, p. 66-68.

(Q7a, L19; Al)

353-Q.* **Wear Resistance: Is Melting Point the Key?** H. A. Unckel. *Iron Age,* v. 181, Mar. 20, 1958, p. 97-100.

Abrasion tests on Al, Cu and Fe samples by sandblasting, carborundum belts and carborundum powder indicate a correlation between abrassion resistance and melting point. 6 ref. (Q9n, P12n)

354-Q.* **Effect of Phosphorus on Tensile and Notch-Impact Properties of High-Purity Iron and Iron-Carbon Alloys.** B. E. Hopkins and H. E. Tipler. *Iron and Steel Institute, Journal,* v. 188, Mar. 1958, p. 218-237.

Investigation on various Fe-P and Fe-P-C alloys. Presence of phosphorus increases strength of alloys and produces progressive development of grain-boundary weakness. In the Fe-P-C alloys carbon eliminates grain-boundary weakness in case of slow cooling after heat treatment. (Q27a, Q6n, 2-60; Fe, *P*)

355-Q.* **A New Standard Hardness Testing Machine.** R. S. Marriner and F. C. P. Mason. *Metallurgia,* v. 57, Jan. 1958, p. 47-51.

A new diamond pyramid hardness testing machine using freely suspended dead weights and a micrometer microscope. (Q29c, 1-53)

356-Q.* **Strain Hardening Behavior of High Purity Copper. An Appraisal of Tests by Carreker and Hibbard.** E. Voce. *Metallurgia,* v. 57, Mar. 1958, p. 111-116.

Effects of temperature from −253 to 950° C. and grain size on various tensile properties of high-purity copper. (Q27a, 2-61, 2-59; Cu-a)

357-Q. Materials for Aircraft Structures Subjected to Kinetic Heating. A. J. Murphy. *Royal Aeronautical Society, Journal,* v. 61, Oct. 1957, p. 653-666.

Steels and Al, Mg, Ti and Ni alloys are compared in the following respects: structural efficiency at ordinary temperatures; thermal stresses; structural efficiency at high temperature. 9 ref. (Q-general, 2-62, T24; ST, Al, Mg, Ni, Ti)

358-Q. Irradiation of Uranium-Fissium Alloys and Related Composition. K. F. Smith. Argonne National Laboratory. *U. S. Atomic Energy Commission,* ANL-5736, Sept. 1957, 55 p.

(Q26s, 2-67, T11g; U-b, *Pu, Mo*)

359-Q. Irradiation Effects on Zirconium-Clad Uranium-Zirconium Fuel Plates. R. E. Bailey. Argonne National Laboratory. *U. S. Atomic Energy Commission,* ANL-5825, Feb. 1958, 10 p.

(Q26s, T11g, 2-67; 8-66, Zr-b, U-b)

360-Q.* (English.) **Fatigue Fracture Criterion in Metals Based on Dislocation Theory.** Takeo Yakobori. *Tohoku University, Technology Reports,* v. 22, no. 1, 1957, p. 51-61.

With static stress it is assumed that under alternating stresses some of the dislocations are also in cyclic motion and are piled up cyclically against obstacles such as inclusions during forward and backward mo-

tion; a ductile fracture occurs and strength does not decrease appreciably. Fatigue theory is tentatively explained: the binding force on the interface between the obstacle and matrix gradually decreases or submicroscopic cracks appear on the interface during cyclic stress. 21 ref. (Q7, M26b)

361-Q.* (French.) **New Machine for Creep Tests Under High Vacuum and Low Load.** A. Gautier. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 9-16.

Components and operation of machine built at French Atomic Energy Commission's research center at Saclay. (Q3, 1-53)

362-Q.* (French.) **On the Nature of Contact Corrosion Products Formed During Tension-Compression Tests on Riveted Joints in Type AG. 5 Light Alloy.** A-R. Weill. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 61-66.

Abundant formation of powdery corrosion products was observed on faying surfaces of joints, whether insulated or not, during tension-compression tests. X-ray diffraction analysis revealed presence of various mono and tri-hydrated forms of alumina, although anhydrous alumina was not found. Possible damage of faying surfaces by these oxides during course of tests discussed in terms of the comparative hardnesses of these corrosion products and of the alloy studied. 8 ref. (Q28, R2; Al, 7-53)

363-Q.* (German.) **Influence of Small Quantities of Impurities on the Hot Hardness of Tungsten.** T. Millner and L. Sass. *Acta Technica Academiae Scientiarum Hungariae,* v. 19, Aug. 1957, p. 115-125.

Investigation of hot hardness by specially constructed semi-micro hardness measuring apparatus. Traces of Si in W increase its hardness at 800° C. from 180 to 250. (Q29p, 1-53; W)

364-Q.* (German.) **New Theory of Rolling.** A. Geleji. *Acta Technica Academiae Scientiarum Hungariae,* v. 19, Aug. 1957, p. 199-241.

Outline of previous theories. New theory holds that resistance to forming is equal to sum of the yield stress and the compressive stress which consists of two components. All three compressive stresses are at their maximum in neutral cross section. (Q23q, F23, 17-52)

365-Q. (German.) **Permissible Loadings of Aluminum Compression Members.** J. Weinhold. *Aluminium,* v. 34, Mar. 1958, p. 143-151.

13 ref. (Q28g; Al)

366-Q. (German.) **Development of Thick-Walled Steel Castings With High Mechanical Properties.** Hans Bühler. *Giesserei,* v. 45, Feb. 13, 1958, p. 87-92.

12 ref. (Q23s, Q23b, 3-71; AY, *Cr,* 5-60)

367-Q. (German.) **Bend Testing of OFHC Copper Wire.** H. Klatte. *Metall,* v. 12, Feb. 1958, p. 125-126.

Method of testing special high-purity Cu by annealing in hydrogen stream and wrapping around a shaft. (Q6; Cu-a)

368-Q. (German.) **Brittleness of Bright Nickel Plating.** K. H. Hartung. *Metallwaren-Industrie und Galvanotechnik,* v. 49, Feb. 1958, p. 42-44.

9 ref. (Q26s, 8-62; Ni)

369-Q.* (German.) **Determination of Notch Toughness, Fracture Appearance and Bending Angle as Dependent on Testing Temperature.** Alexander Schepers and Franz-Rudolf Licht. *Stahl und Eisen,* v. 78, Feb. 20, 1958, p. 227-235.

Determinations were made on DVM test bars taken from round bars of killed openhearth steel, and from mining channels of basic converter rimming-type steel. Assessment of brittle fracture behavior from relative bending angle and relative magnitude of percentage crystallinity in the fracture. Notch toughness value for the transition from mixed to brittle fracture. 14 ref. (Q26, Q23s, 1-54)

370-Q. (Japanese.) **Controlling Directionality of Aluminum Sheet. Pt. 4.** Takuichi Morinaga, Shigeo Zaima, Tsuneo Takahashi and Kunio Shimizu. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 43-47.

5 ref. (Q24; Al, 4-53)

371-Q. (Japanese.) **Controlling Directionality of Aluminum Sheet. Pt. 5.** Takuichi Morinaga and Shigeo Zaima. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 48-50.

Directionality is detected by the damping capacity in cantilever-type transverse oscillation. (Q24, Q8g, Al, 4-53)

372-Q.* (Japanese.) **Effect of Chromium, Iron, Silicon, Manganese or Zirconium on Properties of 52S Alloy Sheets.** Takashi Ikeno and Kizo Shibata. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 51-54.

Specimens containing less than 0.2% and more than 0.3% Cr were inferior in stress-corrosion resistance. Resistance increased with increasing Fe or Si content. Tensile strength and hardness are higher for specimens containing 0.6% Fe, but lower for those with 0.6% Si. Small amounts of Mn or Zr increase tensile strength and hardness. Casting structure becomes very fine with addition of 0.5% Zr. (Q-general, R-general, 2-60; Al)

373-Q. (Japanese.) **Effect of Manganese and Chromium on the Performance of Aluminum-Magnesium 2-5% Wrought Alloys. Pt. 1. Mechanical Properties of Sheet.** Rihei Kawauchi. *Light Metals (Tokyo)*, v. 8, Jan. 1958, p. 55-77.

16 ref. (Q27a, Q23a, R-general, 2-60; Al, Mg, *Cr, Mn*)

374-Q.* (Japanese.) **Difference Between the Effect of Static and Impact Compression on the Internal Friction of Commercially Pure Aluminum.** Genjiro Mima, Riyozo Inoue and Mitsugu Tokizawa. *Light Metals (Tokyo)*, v. 8, Jan. 1958, p. 88-92.

Internal friction decreased to a constant value upon standing at room temperature. Friction introduced by impact compression was greater than that by static compression, with an accelerated decrease of the former on standing. In a 15% reduced specimen, standing at room temperature for 100 min., friction caused by impact compression was several times greater than that caused by static compression. 17 ref. (Q22; Al-a)

375-Q.* **Mechanism of Creep.** *Metal Industry*, v. 92, Jan. 31, 1958, p. 88, 96.

Studies of theoretically possible creep mechanisms demonstrated that no one theory fully covers the data available, but two theories have not yet been shown to be erroneous. One suggests that concentration gradients of vacant lattice sites are set up in a creep specimen under the influence of the applied stress. Vacancies move in accordance with the gradients, setting up a net flow of vacancy causing elongation in the direction of the applied stress. The second theory suggests that the generation and movement of dislocations give rise to an observed strain. (Q3)

376-Q.* **On Kinetic Friction Between Unlubricated Metallic Surfaces.** F. F. Ling and Edward Saibel. *Wear*, v. 1, Dec. 1957, p. 167-172.

Proposes a theory of friction between unlubricated metallic surfaces in sliding contact. Coefficient of friction is found as the ratio of the shear strength to the yield pressure multiplied by a factor in which additional effects of load, relative velocity, temperature and other physical properties appear. Postulates that process of welding and fracturing of surface asperities is a unimolecular reaction. 7 ref. (Q9p)

377-Q.* **Use of Radioactive Specimens on a Kinetic Boundary Friction Machine.** R. B. Campbell and G. Harriden. *Wear*, v. 1, Dec. 1957, p. 173-182.

Modification to a kinetic boundary friction machine necessitated by the use of radioactive Cu as the smaller rubbing contact. Photographic method to detect Cu which has been transferred; quantitative assessment of autoradiography and graphical method of handling experimental results. 7 ref. (Q9p, 1-58; Cu)

378-Q. **Diagnosis and Analysis of Plain Bearing Failures.** P. P. Love. *Wear*, v. 1, Dec. 1957, p. 196-210.

Bearing failures in relation to bearing design, manufacture, assembly and use. 6 ref. (Q7, T7d; SGA-c)

379-Q.* **Alleviating Abrasive Wear in Ceramic Industry Handling Equipment.** C. M. Allen. *Wear*, v. 1, Dec. 1957, p. 232-238.

Application of wear resistant materials in plant equipment forming and fabricating ceramics. 9 ref. (Q9, T29a, 17-57; SGA-m)

380-Q. **Practical Measures to Prevent Abnormal Wear in a Steel Mill.** J. De Vries. *Wear*, v. 1, Dec. 1957, p. 239-243.

(Q9, W10a, ST)

381-Q.* **Review of Boundary Lubrication.** C. B. Davies. *Wear*, v. 1, Dec. 1957, p. 244-253.

Solid boundary lubricants, significance of physical adsorption and molecular orientation, suspensions of metal soaps and lubrication under extreme pressure. 26 ref. (Q9; NM-h)

382-Q. **Castable Ductile Metal for Strong, Complex Parts.** *Western Metalworking*, v. 16, Feb. 1958, p. 23-26.

Properties and uses of Vulcan Spherulite, a ductile iron. (Q-general; CI-r, 17-57)

383-Q.* Engineering Properties of Metals at High Temperatures. N. P. Allen. Paper from "Behaviour of Metals at Elevated Temperatures", Institution of Metallurgists, London, 1957, p. 3-30.

Effects of high temperatures on stability of dimensions and mechanical properties, elastic constant and coefficient of expansion, resistance to plastic deformation and fracture, behavior under fluctuation of temperature, resistance to chemical attacks. Principles involved in developing alloys having good mechanical properties at high temperatures. (Q-general, 2-62; SGA-h)

384-Q.* Effect on Metals of Temperatures up to 450° C. G. Meikle. Paper from "Behaviour of Metals at Elevated Temperatures", Institution of Metallurgists, London, 1957, p. 33-61.

Effects on tensile strength, creep properties, fatigue strength and corrosion resistance of Al, Mg and Ti alloys, sintered Al powder parts, Al-Ni-Fe bronze and stainless steels. Particular reference to structural materials for aircraft and missiles. 12 ref. (Q-general, R-general, 2-62, T24a, 17-57; Al, Mg, Ti, SS, SGA-h)

385-Q.* Non-Ferrous High-Temperature Materials. L. B. Pfeil. Paper from "Behaviour of Metals at Elevated Temperatures", Institution of Metallurgists, London, 1957, p. 67-90.

Types of Co, Ni, Pt, Mo, Cr and Ti-base alloys suitable for temperatures above 500° C. Corrosion resistance, high-temperature tensile strength, creep strength, fatigue strength, other properties. 11 ref. (Q-general, R-general, 2-62; Co, Ni, Pt, Mo, Cr, Ti, SGA-h)

386-Q.* High-Temperature Steels. W. B. Bardgett. Paper from "Behaviour of Metals at Elevated Temperatures", Institution of Metallurgists, London, 1957, p. 93-122.

Reviews corrosion resistance, creep strength, high-temperature tensile strength, ductility of carbon steels, low-alloy steels, intermediate steels, 12% Cr steels and austenitic steels. Relation of properties to composition. 23 ref. (Q-general, R-general, 2-62; CN, AY, SS, SGA-h)

387-Q. Changes of Mechanical Properties of Nickel-Chromium Alloys Used in Stationary and Propulsion Turbines Upon Isothermal Prolonged Heating (up to 10,000 Hr.). V. Z. Tseitlin and G. G. Morozova. *Metallovedenie i Obrabotka Metallov,* Jan. 1958, p. 30-35. (Henry Brutcher, Altadena, Calif., Translation no. 4121.)

Ni-Cr steel containing Mo and W and also Al and Ti in 1:2 ratio is very stable at 700 and 750° C. Relaxation curves indicate excellent heat resistance. Physico-chemical processes are extremely slow; alpha phase remains in the alloys even after 10,000 hr. at 750° C. Certain changes took place after 1000-3000 hr., probably due to decomposition of double carbides without. however, any practical effect upon the process of relaxation. 5 ref. (Q3; SGA-h, Ni, Cr)

388-Q.* (English.) **Fatigue Fractures and How to Avoid Them.** *Aciers Fins & Speciaux Francais,* no. 27, Dec. 1957, p. 48-57.

Nature of, factors involved in, and influence of various designs and conditions on fatigue fracture. Examples illustrate shapes and surfaces prone to fatigue fracture. Suggestions for improving endurance. 5 ref. (Q7a, 17-51)

389-Q.* (English.) **Some Experiments on the Embrittlement of Malleable Iron. Pt. 2.** Nobuhisa Tsutsumi. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 17-26.

Malleable iron specimens with phosphorus varying from 0.1-0.36% were held at different temperature for times up to 100 hr. to study the ductile-to-brittle transition. Results of Charpy impact tests, corrosion tests, electron diffraction examination, metallographic examination, microhardness tests, electropotential measurements of iron in ductile and in brittle states. (Q26s, 1-54; CI-s)

390-Q. (English.) **Measuring the Coefficient of Friction in Cold Strip Rolling.** Hiroshi Yamanouchi and Yuji Matsuura. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 57-62.

(Q9p, F23; 4-53)

391-Q. (Czech.) **Tests Made With Relaxation Test Block Assemblies.** Radovan Pech. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1106-1108.

Methods of improving test blocks for relaxation tests including improved clamping, extension of gage length and use of polished platinum fillets with focusing grooves. Good reproducibility with method. (Q3a)

392-Q.* (Czech.) **Relaxation Testing Machines.** Radovan Pech, Petr Jeh-

licka, Jaroslav Sorm and Jaroslav Viso. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1103-1106.

Principles of spring-loading and moving-load creep testing machines, relaxation tests made on both machines with Skoda T56 material during 1000 hr. at 500° C. and 30 kg. per sq. mm. starting stress. Results from different machines varied by only 0.6 kg. per sq. mm. (Q3a)

393-Q. (Czech.) **Tests Made With Relaxation Rings.** Jaroslav Kermes. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1108-1111.

Tests made with ring of constant diameter with required stress induced into the rings by inserting a wedge. Tensometric measurements showed that the value of the stress and displacement on the circumference of the ring agree with theoretical calculations. Method compared to other creep tests. (Q3a)

394-Q. (Czech.) **Importance of Hot Stress Relaxation Study in Machine Parts of More Complex Form.** Jaroslav Nemec. *Hutnické Listy,* v. 12, no. 12, 1957, p. 1111-1115.

Importance of creep tests for calculating stress values in machine parts exposed to elevated temperatures. Principles, present theoretical state and experimental techniques for study of hot relaxation. Influence of form of complex machine parts on relaxation ratio; relation to processes existing in a complex metal structure. (Q3a)

395-Q.* (German.) **A Contribution to the Knowledge of Wear-Resistance of Bainitic-Hardened Cast Iron.** Richard G. Walzel and Hermann Ortner. *Wear,* v. 1, Dec. 1957, p. 183-195.

Structure and properties of two grades of cast iron after isothermal transformation in the tempering range of bainitic hardening. Compares wear resistance and other properties to the same grades of cast iron with a martensitic structure. Wear resistance for the lower bainitic hardening range (350° C.) is superior to normal hardened and tempered iron. 9 ref.
(Q9n, N8m; CI)

396-Q. (German.) **Standardization in the Field of Wear.** H. Wahl. *Wear,* v. 1, Dec. 1957, p. 211-224.

Suggestions on standardization of definition and classification of wear. Problems in standardizing wear testing, specifically wear of metals under the influence of minerals. (Q9)

397-Q. (German.) **Slide, Wash and Blast Wear Testing.** K. Wellinger and H. Uetz. *Wear,* v. 1, Dec. 1957, p. 225-231.

Abrasive effects of granulated materials under conditions of dry or wet sliding, rinsing with a suspension or a sludge of granulated materials and blasting. Experience with reference to such variables as hardness, structure of abraded material, hardness of the abrasive, influence of moisture, temperature and the angle of the abrasive beam in blasting. Abrasion resistance of steel and white cast iron.
(Q9, 1-4; ST, CI-p)

398-Q.* (Polish.) **Influence of Steel Microstructure Upon Suppression of Ultrasonic Waves.** Waclav Rozanski and Stanislaw Madej. *Hutnik,* v. 24, Nov. 1957, p. 452-457.

Damping of ultrasonic waves in solid bodies. Relationship between damping coefficient and microstructure of the medium transferring wave motion. Results of investigation of ultrasonic wave damping in annealed carbon steels. Utilization of damping phenomenon for determination of the grain size in steel. 9 ref. (Q21f, Q22, M27c; ST)

399-Q. (Book.) **Behaviour of Metals at Elevated Temperatures.** 122 p. 1957. Institution of Metallurgists, 4 Grosvenor Gardens, London, S.W.1, England. 21s.

Lectures delivered at the Institution of Metallurgists Refresher Course, 1956. Papers abstracted separately. (Q-general, 2-62)

400-Q. Aluminum in Rolling Stock Impact Tests at Collision Speeds. R. A. Campbell, J. G. Sutherland, J. F. Whiting and R. A. Kemp. *American Society of Mechanical Engineers,* Paper no. 58-RR-1, Apr. 1958, 13 p.
(Q6s, T23p; Al)

401-Q. Properties Affecting Suitability of 9 Per Cent Nickel Steel for Low-Temperature Service. T. N. Armstrong, J. H. Gross and R. E. Brien. *American Society of Mechanical Engineers,* Paper no. 58-MET-3, Apr. 1958, 9 p.

Charpy values for both keyhole and V-notch specimens reported for test temperatures down to −320° F.
(Q6; AY, *Ni,* 2-63)

402-Q. Solid Lubricant Coatings. L. M. Berry. *American Society of Mechanical Engineers,* Paper no. 58-AV-20, Mar. 1958, 27 p.

Quantitative data on some of the variables affecting the performance

of dry-film lubricants. The tests, made on a Falex lubricant tester, show that optimum performance can be obtained only if the variables affecting their use are known and taken into account.
(Q9; NM-h)

403-Q. Survey of the Mathematics Available for Describing Fracture. A. E. Scheidegger. *Canadian Journal of Physics,* v. 36, Mar. 1958, p. 300-308.

10 ref. (Q26, M26b)

404-Q.* Selection of Steels for Springs. H. J. Elmendorf. *Metal Progress,* v. 73, Apr. 1958, p. 80-84.

Mechanical properties of spring wire and springs; by knowing the wire tensile strength, the spring design stress can be predicted and the proper spring steel can be selected.
(Q21, Q23b, Q27a; ST, SGA-b)

405-Q.* Tear Test for Titanium Sheet. C. W. Vigor and J. R. Hornaday, Jr. *Metal Progress,* v. 73, Apr. 1958, p. 103-107.

Small coupons are torn by a conventional tensile testing machine. The amount and duration of applied force are recorded and used to determine the work required for tearing. Resulting data measure effect of hydrogen embrittlement and thermal instability.
(Q26q, Q26s, 1-54; Ti, *H*)

406-Q. (German.) **Determination of Notched-Bar Toughness Using Small Test Specimens.** Vladimir Komarek. *Acta Technica,* v. 3, Jan. 1958, p. 26-57.

(Q6)

407-Q.* (German.) **Testing Devices and Testing Procedures for Extended Creep of Steel Subjected to Elevated Temperatures.** K. G. Olsson. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 679-685.

A testing device was designed which resulted in a homogeneous distribution of stresses in the specimens. The elongation was measured and recorded accurately with gages. (Q3, 1-53)

408-Q. (German.) **Results of Extended Creep Tests on Ferritic and Austenitic Steels Subjected to Elevated Temperatures.** André Constant. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 695-702.

Creep tests in France on a large number of steels conventionally used for high-pressure steam pipes, for steel castings and for large forgings. (Q3; ST)

409-Q.* (German.) **Results of Creep Tests on Material for Steel Pipes. Determination of Design Characteristics Such as Tensile Strength.** Fritz Eberle. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 702-706.

Temperatures between 455° C. and 980° C. were chosen for the tests and the time was up to about 40,000 hr. The previous heat treatment was varied as to hardening temperatures, quenching and annealing conditions. The strain-time curves on some steels show a distinctive bend at a certain point, indicating a structure transformation. Unless rupture occurred the curves remain straight thereafter in double logarithmic representation.
(Q3, Q27a, 17-51; SS, SGA-h)

410-Q.* (German.) **Development of High-Temperature Steels and Their Testing in Czechoslovakia.** Jaroslav Pluhar. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 707-710.

Creep tests were carried out at 550° C. on steel castings (0.1% C, 0.5% Cr, 0.8% Mo, and 0.1 to 1.5% Ni) and (0.1% C, 0.5% Cr, 0.8% Mo, 0.25% V), and (0.1 to 0.6% Ni). The steel was hardened at 1100° C., quenched in oil and annealed at 720° C. for 6 hr. Notched and unnotched specimens were investigated. In tests up to 20,000 hr., no disadvantageous effects of the Ni content were observed. The embrittlement of Ni steels formerly observed and a frequent cause of rejection can be attributed to improper heat treatment. 30 ref.
(Q26s, 2-60, 2-64; AY, SGA-h, 5-60)

411-Q.* (German.) **Variations of Creep Velocity in a Carbon Steel Subjected to Creep Tests.** Axel Johansson. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 712-715.

On a normalized carbon steel with 0.16% C the creep curve was recorded at 450° C. up to 21,000 hr. The creep velocity was derived from the creep curve and plotted in a diagram. The velocity curve is of an irregular shape and does not lend itself for extrapolation for longer times. Annealing at 600° C. did not show more satisfactory results. (Q3; CN)

412-Q.* (German.) **Scattering of Results of Extended Creep Tests at Elevated Temperatures.** Wilhelm Schlüter. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 717-719.

Samples of Cr-Mo pipe steel were taken from different steel mills and different heats and subjected to

creep tests up to 40,000 hr. at 550° C. The scattering of results amounted to ±20% about the mean. Therefore, it may be advisable for design purposes to give the mean as the main characteristic and also the maximum observed deviations. This eliminates the troubles of testing each individual heat. (Q3, 1-54; SS)

413-Q.* (German.) **Creep Tests With Small Specimens and Their Evaluation.** Alfred Keller and Werner Stauffer. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 719-726.

For large-scale creep test, space and furnace requirements became excessive. Therefore, a small specimen was developed and a large number of tests were carried out on low and high-alloy steels (12 to 25% Cr, 8 to 20% Ni, 3% Mo and 7% Co). The results for the same alloy but from different heats were represented on stress-time diagrams, showing the disposition range and on the lower boundary the minimum requirements. 6 ref. (Q3, 1-60; AY, SS)

414-Q.* (German.) **Statistical Evaluation of Results From Extended Creep Tests at Elevated Temperatures as a Means for the Determination of Minimum Requirements.** Hans Zschokke. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 726-730.

Statistical evaluation methods were applied on 200 samples of steel (3% Cr, 0.6% Mo, 0.3% V, 0.5% W) subjected to stresses of 30, 22 and 20 kg. per sq. mm. at 550° C. Means, standard deviations and confidence ranges were calculated. Tests on single specimens can be extremely unreliable, and short-time tests should be conducted on a large number of specimens from the same material. (Q3, 1-54, S12)

415-Q.* (German.) **Observations on Electrically Conductive Rubber Models. Useful for the Explanation of Processes Occurring in Strained Metals.** W. Spath. *Metall,* v. 11, Oct. 1957, p. 859-863.

Measurement of electric conductivity and its variation on rubber models. Internal stresses in microscopic areas observed and explained through molecular rearrangements, indicating similar phenomena in metals. Behavior under static and periodic loads was recorded by electric means permitting much finer observations than the mechanical instruments conventionally used. 4 ref. (Q25, 1-54)

416-Q. (German.) **Creep Tests on Brass.** H. Vosskuhler. *Metall,* v. 11, Nov. 1957, p. 944-945.

(Q3; Cu-n)

417-Q. (German.) **Influence of Surface Structure on Forming Properties of Metals. Pt. 2.** H. Wiegand. *Metalloberflache,* v. 12, Mar. 1958, p. 65-68.

Oxide films, diffusion coats (carburizing and nitriding), deposition coats (electrolytic deposits, weld deposits, plating). Structure and influence on forming properties. (Q23q, 3-71, 8)

418-Q. (Russian.) **Wear Resistance of Iron Particles.** O. A. Nesvizhskii. *Liteinoe Proizvodstvo,* Jan. 1958, p. 5-6.

Study of microstructure of iron particles cast by various means such as in earthen molds, stationary chill casting, vibration and centrifugal methods so as to determine their resistance to cracking and abrasion. 6 ref. (Q9n, M27; CI)

419-Q. (Russian.) **New Low-Alloy Structural Steel.** I. S. Kozlovskii. *Vestnik Mashinostroeniya,* Feb. 1958, p. 6-10.

The addition to medium-carbon structural steel of 0.002-0.005% boron in the form of ferroboron increases its strength to the point where it can replace many more expensive, high-alloy steels. 5 ref. (Q-general; AY, *B*)

420-Q. (Russian.) **Effect of Sulphur in Fuel on Wear of Diesel Parts.** M. S. Smirnov. *Vestnik Mashinostroeniya,* Feb. 1958, p. 34-36.

4 ref. (Q9, R7k, W11j)

421-Q. (Russian.) **Increasing Durability of Cutting Tools During Grinding by Cooling Under High Pressure.** A. V. Pakhomov. *Vestnik Mashinostroeniya,* Feb. 1958, p. 55-56.

(Q9n, T6n, 2-63, 3-74)

422-Q. (Russian.) **Wear Resistance of Enamel Coated Machine Parts.** V. S. Lomakin and V. I. Savchenko. *Vestnik Mashinostroeniya,* Feb. 1958, p. 64-66.

(Q9, T7, 8-71)

423-Q. (Russian.) **Increasing Wear Resistance and Lengthening Service of Machinery.** D. A. Draigor. *Vestnik Mashinostroeniya,* Feb. 1958, p. 81-82.

(Q9n, T7)

424-Q. (Russian.) **Investigation of Location of Plastic Deformation During Creep Under Conditions of Intense Strain.** I. A. Oding and G. A. Tulyakov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1478-1480.

5 ref. (Q24, Q3)

425-Q. (Russian.) **Determination of Elastic Limit and Yield Point of Thin Spring Wire During Torsion.** K. G. Galimkhanov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1485-1488.

5 ref.

(Q7, Q21a, Q27a, Q1, T7c; 4-61)

426-Q. (Russian.) **Determination of Fatigue Limit.** V. S. Ivanova and L. K. Gordienko. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1489-1492.

(Q7)

427-Q. (Russian.) **Verification of Testing Methods of Wear-Resistant Qualities.** V. A. Shevchuk. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1492-1494.

(Q9n)

428-Q. (Russian.) **Determination of Internal Tensions in Galvanized Coatings.** Sh. Z. Zakirov and Yu. N. Petrov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1495-1496.

(Q25; *Z,* 8-15)

429-Q.* Effects of Cold Rolled Threads on the Properties of High Temperature Chromium-Molybdenum Steel Threads. J. W. Jenkins, W. L. Williams and J. L. Herring. *Bureau of Ships Journal,* v. 6, Feb. 1958, p. 7-12.

Room-temperature tension tests and elevated-temperature creep relaxation tests were performed on Cr-Mo steel bolt studs to compare the effects of cut threads and cold rolled threads. The thread rolling produced a significant reduction in proof stress which could largely be recovered by stress relief. The yield strength was not similarly affected, at least to any large extent. The relaxation properties were independent of the threading procedure and of the stress-relief treatment used to improve the proof stress. The results indicated that the yield strength had gretaer utility than the proof test for specification acceptance testing.
(Q27, Q3a, G12; AY, *Cr, Mo*)

430-Q. Camera Shows How Parts Burst at High Speeds. R. H. Eshelman. *Iron Age,* v. 181, Apr. 17, 1958, p. 116-118.

Camera records exact instant Ti jet engine compressor wheel flies apart. (Q7, X5j, T24b; Ti)

431-Q.* Use of Paraffin Wax as a Model Material to Simulate the Plastic Deformation of Metals. Pt. 2. Practical Applications of This Technique. J. W. Barton, C. Bodsworth and J. Halling. *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 321-331.

Use of paraffin wax for study of several metal forming operations. Close correlation obtained between theoretical and practical conditions for direct extrusion with lubricated and rough dies. A wide range of practical friction conditions can be obtained by suitable choice of the deforming surfaces. Effects of extrusion temperature gradient in the billet. Technique extended to the deformation of material passing through a commercial rolling mill. 17 ref. (Q23q, F23, F24, 17-56)

432-Q.* How Grinding Affects Fatigue Strength. L. P. Tarasov. *Metalworking Production,* v. 102, Feb. 21, 1958, p. 323-327.

Recent studies show that good commercial grinding practice does not lower fatigue limit despite high tensile stresses. Severe grinding caused some drop in fatigue limit. When grinding oil was used, surface was strengthened enough to raise the fatigue limit. High residual tensile stresses were associated with smaller drop in fatigue limit. Residual grinding stresses were not reduced measurably as a result of fatigue testing. Fatigue limits of all hardened steels are likely to benefit from the cold working of the surface, during grinding. 8 ref.
(Q7a, G18; ST)

433-Q.* Creep of Aluminum-Copper Alloys During Age Hardening. E. E. Underwood, L. L. Marsh and G. K. Manning. *National Advisory Committee for Aeronautics,* Technical Note 4036, Feb. 1958, 73 p.

Interrelation of aging during creep and creep during aging studied in polycrystalline Al alloys containing 1 to 4% Cu. Experimental procedures included interrupted creep tests, tensile tests of creep specimens, quantitative metallographic determination of precipitation during creep, hardness measurements on unstressed and stressed aged alloys, X-ray studies of deformation in the crystalline lattice, and microscopic examination of the

surface deformation markings. 40 ref. (Q3, N7a; Al-b, *Cu*)

434-Q. Mechanism of Boundary Lubrication and the Properties of the Lubricating Film. Short and Long-Range Action in the Theory of Boundary Lubrication. B. V. Deryaguin, V. V. Karassev, N. N. Zakhavaeva and V. P. Lazarev. *Wear,* v. 1, Feb. 1958, p. 227-290.

Two versions of the blow-off method, by which the dependence of the viscosity of oils and other non-volatile fluids on the distance from the solid wall can be measured, and the viscosity localized with an accuracy of 10 Å. Mechanical properties of the boundary lubrication layer explain both the existence of static friction and the observation of the two-term friction law derived from the molecular theory of friction. 28 ref. (Q9, NM-h)

435-Q. Extreme-Pressure Lubricating Properties of Some Sulphides and Disulphides, in Mineral Oil, as Assessed by the Four-Ball Machine. W. Davey and E. D. Edwards. *Wear,* v. 1, Feb. 1958, p. 291-304.

Disulphides are superior to monosulphides as extreme-pressure additives; mechanism of action of these compounds. 14 ref. (Q9, 18-73, NM-h)

436-Q. Wear of Metals. F. T. Barwell. *Wear,* v. 1, Feb. 1958, p. 317-332.

Phenomena associated with rolling contact, scuffing, fretting, corrosion, simple sliding with and without oxygen. Examples of practical cases. 14 ref. (Q9)

437-Q. Review of the Friction of Solids. F. P. Bowden. *Wear,* v. 1, Feb. 1958, p. 333-346.

31 ref. (Q9p)

438-Q. Deoxidation and Technological Characteristics of Killed Basic Converter Steels. Pt. 1. Deoxidation Process as Well as Aspect and Composition of Deoxidation Products. Pt. 2. Inclusions, Degree of Purity and Mechanical and Technological Properties. Erin Plockinger and Rupert Rosegger. *Stahl und Eisen,* v. 77, May 30, 1957, p. 701-714; June 13, 1957, p. 798-804. (Iron and Steel Institute, Translation no. 667.)

Previously abstracted from original. See item 724-Q, 1957. (Q27a, Q5g, Q6n, D11r; ST-c, 9-69)

439-Q.* (Czech.) Study of the Dynamic Impact Test. Ales Vetiska and Antonin Till. *Hutnické Listy,* v. 13, Jan. 1958, p. 37-42.

Deformation characteristics of dynamically stressed material are obtained by piezo-electric transmission of sudden forces with the oscillograph. Calculations based on permanent deformation of test rods submitted to impact show that the development of dynamic forces dependent on deformation is similar to that obtained with the oscillograph, the calculated forces being higher. 7 ref. (Q6, 1-54)

440-Q. (French.) Brinell Hardness of Castings. J. Van Eeghem. *Fonderie Belge,* v. 28, Feb. 1958, p. 58-60. (Q29, 5-60)

441-Q.* (French.) Research on Hot Deformation of Steels. Pt. I. Development of Variable-Speed Hot-Torsion Testing Machine. Hot Torsion Tests; First Results. C. Rossard and P. Blain. *Institut de Recherches de la Siderurgie (IRSID), Publications,* Series A, no. 174, Oct. 1957, 88 p.

Specimens of 0.25% carbon steel, 18-8 stainless and 25% Cr steel were tested in specially designed apparatus to provide experimental data for theories of plasticity at recrystallization temperatures and to establish relationships between composition and structure of steel, load, speed of deformation, type of deformation and temperature. 22 ref. (Q1, 1-53, 1-66; ST)

442-Q. (French.) Study of Metallic Parts. Strength of High Pressure Vessels. R. Epain. *Metallurgie et la Construction Mécanique,* v. 90, Feb. 1958, p. 97-105.

Cylinder was submitted to enough pressure to create permanent deformation. (To be continued.) (Q24, 3-74, T26q)

443-Q.* (French.) Relationships Between Sub-Zero and Hot Brittleness in 18-8 Stainless Steels. Andre Gueussier and René Castro. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 107-122.

Carbide precipitations caused by tempering of austenitic steels are accompanied by brittleness at low temperatures and by a shift of impact-temperature curves toward higher temperatures. Analysis of this embrittlement reveals characteristics of these precipitations when steels contain Ti or Cb. Embrittlement at high temperatures is observed. Precipitates responsible for embrittlement can occur during course of deformation, and kinetics of their formation depends largely on composition and prior heat treat-

ment of steels. 21 ref.
(Q26s, 2-62, 2-63; SS)

444-Q. (French.) **Dynamic Calibration of Fatigue Testing Machines.** J. Kalbfleisch. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 166-178.

(Q7, 1-53, S23)

445-Q.* (German.) **Effect of Gas and Salt Bath Nitriding on Properties of Structural Steels. Pt. 2.** H. Wiegand and M. Koch. *Metalloberfläche,* v. 12, Apr. 1958, p. 97-101.

Investigation on steels C 35, C 60, 16 MnCr 5, 34 Cr 4, 34 CrAl 6. Experimental conditions; results; fatigue fracture.
(Q-general, 2-64, J28k; AY)

446-Q. (Russian.) **Determination of Modulus of Elasticity of Sheet Metal.** S. O. Tsobkallo and Z. A. Bashchenko. *Zavodskaya Laboratoriya,* Jan. 1958, p. 68-70.

6 ref. (Q21a; 4-53)

447-Q. (Russian.) **New Method of Investigation of Deformation of Metals.** N. I. Skryabin. *Zavodskaya Laboratoriya,* Jan. 1958, p. 82-83.

4 ref. (Q24, 1-54)

448-Q. (Russian.) **Fatigue Testing of Tempered Steel.** I. E. Kolosov. *Zavodskaya Laboratoriya,* Jan. 1958, p. 90-91.

(Q7; ST)

449-Q. (Russian.) **Determination of Fatigue in Cable Wires During Asymmetric Cycle.** M. S. Bel'mes. *Zavodskaya Laboratoriya,* Jan. 1958, p. 117-118.

(Q7, T1b)

450-Q.* **Steels at Elevated Temperatures With Special Reference to the Use of Molybdenum.** J. D. Murray. *Alloy Metals Review,* v. 9, Mar. 1958, 8 p.

Requisite properties for elevated temperatures including corrosion resistance, weldability, tensile strength, fatigue strength, creep resistance and high-temperature ductility. Effect of Mo on creep strength and ductility. Microstructure of alloy steels and mechanism by which Mo imparts properties. 8 ref.
(Q-general, R-general, K9s, 2-62, 2-60; AY, *Mo*)

451-Q. **High Strength Parts.** Jack Doelker. *Ordnance,* v. 42, Mar-Apr. 1958, p. 916-917.

Properties of parts produced from electrolytic iron powders by pressing, sintering and carburizing.
(Q-general; Fe, 6-72)

452-Q. **Effect of Fabricated Edge Conditions on Brittle Fracture of Structural Steels.** L. A. Harris and N. M. Newmark. *Welding Journal,* v. 37, Apr. 1958, p. 137s.

(Q26s; ST, SGB-a)

453-Q.* **Proposed Procedure for Testing Shear Strength of Brazed Joints.** F. M. Miller and R. L. Peaslee. *Welding Journal,* v. 37, Apr. 1958, p. 144s-150s.

Requirements for design of standard shear tests specimens, test procedure and test evaluation in determining tensile shear strength of brazed joints. 14 ref.
(Q2g, 1-60; 7-52)

454-Q.* **Ductility and Energy Relations in Charpy Tests of Structural Steels.** J. H. Gross and R. D. Stout. *Welding Journal,* v. 37, Apr. 1958, p. 151s-159s.

Relationship of energy absorption in V-notch Charpy impact test to notch ductility. Evaluates ductility by measuring lateral expansion produced during deformation at side of specimen opposite notch. Influence of tensile strength on energy absorption and lateral expansion of ASTM alloys A203, A212, A285, A302, A387, and 48s5 HT HY65, T1, C-1032 steels. Use of lateral expansion data for determining ductile-to-brittle transition temperature. 18 ref.
(Q6, Q23s, Q23p; ST, SGB-a)

455-Q.* **The Behavior of Molybdenum Single Crystals Under Various Stress Conditions.** R. Maddin. Paper from "The Metal Molybdenum", American Society for Metals, p. 214-240.

Growth of Mo single crystals; appearance of slip lines; structural changes of deformation; effect of bending on resistivity; determination of slip elements; rolling and recrystallization. 6 ref.
(Q24, N3r; Mo, 14-61)

456-Q.* **Ductile-to-Brittle Transition in Molybdenum.** J. H. Bechtold and E. T. Wessel. Paper from "The Metal Molybdenum", American Society for Metals, p. 241-261.

A ductile-to-brittle transition is a general characteristic of body-centered cubic metals, and the transition temperature of Mo is within the range expected as based on correlations with the melting point or, more accurately, with the modulus of elasticity. There appears to be little chance of eliminating the tendency for brittle behavior in Mo, or for greatly reducing the minimum temperature range of its occurrence

by known practical metallurgical techniques. 6 ref. (Q23r; Mo)

457-Q.* Effects of Oxygen, Nitrogen, and Carbon on the Ductility of Wrought Molybdenum. H. S. Spacil and J. Wulff. Paper from "The Metal Molybdenum", American Society for Metals, p. 262-280.

Adjusting the balance of carbon, oxygen and nitrogen in commercial Mo. Vacuum annealing and zone refining for stabilizing Mo are useful only for research purposes. Of far greater practical importance is stabilization by small alloy additions of such highly reactive metals as Ti, Zr and Hf. Such additions raise the recrystallization temperature 390° F., increase the hot strength, and reduce the possibility of embrittlement in the temperature range 2730 to 3810° F. 32 ref. (Q23p, 2-60; Mo)

458-Q.* Effects of Hot-Cold Work on the Properties of Molybdenum Alloys. R. Q. Barr, M. Semchyshen and I. Perlmutter. Paper from "The Metal Molybdenum", American Society for Metals, p. 462-510.

Molybdenum alloyed with 0.28% Cb or 0.5% Ti was strain hardened when rolled or forged at temperatures up to 2400° F. The hardness produced by a given amount of deformation varied with the deformation temperature. Provided no recrystallization occurred during deformation, the higher the working temperature in the range 1800 to 2400° F. the higher the hardness of the wrought structure. 3 ref. (Q29n, 3-68, 2-61; Mo-b)

459-Q. Effect of Structure of Titanium-Tungsten Carbide Compositions on the Life of Tool Tips. P. K. Mikhailova. *Stanki i Instrument,* v. 28, no. 6, 1957, p. 26. (Henry Brutcher, Altadena, Calif., Translation no. 3966.)

Previously abstracted from original. See item 133-Q, 1957. (Q23, 3-71; 6-69)

460-Q. Study of Zone Failure in Creep. I. L. Mirkin and I. I. Trunin. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 2-7. (Henry Brutcher, Altadena, Calif., Translation no. 3979.)

Previously abstracted from original. See item 37-Q, 1958. (Q3, M26)

461-Q. Service Life of Aluminized Steel Parts at High Temperatures. P. Grobner. *Hutnické Listy,* v. 10, 1955, p. 600-605. (Henry Brutcher, Altadena, Calif., Translation no. 4077.)

Previously abstracted from original. See item 34-Q, 1956. (Q-general, L15; *Al,* ST)

462-Q.* (English.) Ferrito-Pearlitic Steels for the Construction of Steam Turbines. R. Pokorny, T. Buzek and T. Kermes. *Czechoslovak Heavy Industry,* no. 2, 1957, p. 22-29.

Results of creep relaxation, fatigue and corrosion tests on ferrito-pearlitic steels of Czech formulation including Skoda T56, HDT, TBW 50, TBMO 50, HDM, TBV40, and N10. (Q3, Q7, R-general, W11k, 17-57; ST)

463-Q.* (Czech.) Ductility Evaluation of Steels Cast in Vacuum. Vladimir Hasek. *Hutnické Listy,* v. 13, Mar. 1958, p. 221-226.

Ductility of steels cast in the usual way, those cast under vacuum and those exposed to vacuum during and after casting was tested with equipment intended for torsion testing. Vacuum cast steel, owing to its fine-grained structure and less developed dendritic structure in the as-cast state, has better ductility even at higher degree of forging than cast steel in the usual way. (Q23p, D8m; ST)

464-Q. (Czech.) Properties of Wrought Iron After Service in Railway Bridges. Jaroslav Sorm. *Hutnické Listy,* v. 13, Mar. 1958, p. 226-230.

Tests on old material used for bridge construction show that strength values are satisfactory when stressed in tension. 7 ref. (Q23, Q25, T26p; 17-57; Fe-m)

465-Q. (Dutch.) Copper and Copper Alloys. Pt. 17. W. G. R. Jager. *Metalen,* v. 13, no. 5, 1958, p. 92-96.

Tabulated results of microhardness measurements made on an English plastic bronze (6% Sn, about 3.5% Pb), an American plastic bronze (agreeing in composition with the German bronze MSnBz4Pb, DIN 17662), a Ni-Al cast bronze (11% Al, some Mn and Fe), and a Ni-Al plastic bronze (9-10% Al, 1-3% Ni, several % Fe). (Q29q; Cu-s)

466-Q.* Effect of Hydrogen on the Fatigue Properties of Titanium and Ti-8 Pct Mn Alloy. L. W. Berger, W. S. Hyler and R. I. Jaffee. *AIME Transactions,* v. 212, Feb. 1958, p. 41-45.

Additions of 390 ppm. hydrogen to A-55 Ti and 368 ppm. to 8% Mn alloy have no deleterious effect on the unnotched and notched rotating-beam fatigue properties. These amounts of hydrogen are sufficient to cause severe notch-impact em-

brittlement in A-55 Ti and pronounced loss of tensile ductility in 8% Mn alloy. Lack of embrittling effect in fatigue in the latter alloy is consistent with the postulated strain-aging mechanism of hydrogen embrittlement in alpha-beta alloys. 14 ref. (Q7, Q26s; Ti-b, *H*)

467-Q.* Anomalous Behavior During Cold Working and Subsequent Heating of Certain Magnesium Base Alloys. J. C. McDonald. *AIME Transactions,* v. 212, Feb. 1958, p. 45-46.

Magnesium alloy with 1.5% Mn and 0.2% Ce (mischmetal) was cold rolled 60%, starting from 0.040 in. Studies show considerable hardening in as little as 3 min. at 400° F. (e.g., tensile yield strength increased 50%). Softening at higher temperatures is easily explainable in terms of observed recrystallization. There is no explanation of the work softening, followed by the anneal hardening. 8 ref.
(Q-general, 2-64, 3-68; Mg-b)

468-Q.* Effect of Crystallographic Orientation and Oxygen Content on Knoop Hardness Values of Iodide Titanium. C. Feng and C. Elbaum. *AIME Transactions,* v. 212, Feb. 1958, p. 47-50.

Knoop hardness measurements were carried out on large grains of iodide titanium containing different amounts of oxygen. For each oxygen content the hardness is recorded as a function of the crystal orientation and of the angle ϕ between the indenter diagonal and the projection of the C (hexad) axis in the surface. 9 ref. (Q29, 3-72; Ti)

469-Q.* Hydrogen Embrittlement of Vanadium by Catalytic Decomposition of Water With Manganese. B. W. Roberts, G. W. Sears and P. D. Zemany. *AIME Transactions,* v. 212, Feb. 1958, p. 71-73.

Vanadium metal is embrittled by hydrogen at a temperature as low as 250° C. when held in the presence of Mn metal and water vapor in a rough vacuum. Property changes are caused by the catalytic decomposition of water vapor at the V surface and the diffusion into and solution in the V of the resultant hydrogen. Mn is a necessary component of the catalyst. 9 ref.
(Q26s, 2-63, P13c; V)

470-Q. Fracture of Temper Brittle Steel. L. D. Jaffe and D. C. Buffum. *AIME Transactions,* v. 212, Feb. 1958, p. 73-74.

Alloy steels display two forms of temper brittleness, which may be called upper-nose and lower-nose. Upper-nose can be distinguished from lower-nose temper brittleness by visual inspection of the fractured surface of specimens broken under such conditions that the fracture is brittle. 5 ref. (Q26s; ST)

471-Q. Rectangular Cracking in Lead. K. U. Snowden and J. N. Greenwood. *AIME Transactions,* v. 212, Feb. 1958, p. 91-92.

The rectangular pattern found in lead fatigue failures can be caused by boundary migration. Boundaries which have reached a location making a 45° angle with the stress are particularly subject to atmospheric attack. A crack starts and this locks the boundary from further migration. (Q7, M27f; Pb)

472-Q. Anelastic Measurements on the Alloy Cu_3Au. W. A. Goering and A. S. Nowick. *AIME Transactions,* v. 212, Feb. 1958, p. 105½-106.

Measurements of the internal friction as a function of temperature were made in a torsion pendulum. 7 ref. (Q22, 2-61; Cu, Au)

473-Q.* Effect of Composition and Heat-Treatment on the Uniform Elongation and Flow Properties of Alpha-Beta Titanium Alloys. A. J. Griest, H. A. Robinson and P. D. Frost. *AIME Transactions,* v. 212, Feb. 1958, p. 117-121.

Flow characteristics and uniform elongation of alpha-beta Ti alloys in the solution treated condition are markedly affected by the solution temperature. Two classes of alpha-beta alloys were distinguished, based on the effect of solution temperature on the uniform elongation. Martensitic alpha-beta alloys, which are relatively weakly beta-stabilized, showed decreasing values of uniform elongation as the solution temperature was initially increased.
(Q24, 2-60, 2-64; Ti-b)

474-Q.* Twinning and Cleavage in Tantalum. C. S. Barrett and R. Bakish. *AIME Transactions,* v. 212, Feb. 1958, p. 122-123.

Impact deformation of Ta sheet produces twins at −196 but not at −77 or 25° C. The twins are on {112} planes. Small amounts of crystallographic cleavage were observed under impact at −196° C. Cleavage facets were chiefly on {110} planes. (Q24b, Q26n; Ta-a)

475-Q.* Tensile Strength of Sintered Iron Powder as a Function of Sur-

face Area and Particle Shape. P. R. Basford and S. B. Twiss. *AIME Transactions,* v. 212, Feb. 1958, p. 124-130.

Relationship between areas of iron powders, briquettes and sintered compacts and tensile strength. Two types of areas exist in such powders —a macroscopic area due to the shape and size of particles and a microscopic area due to pores and cracks in the surface. Only the macroscopic area, specifically the area due to particle irregularity, contributes to tensile strength. 16 ref. (Q27a, H12j; Fe, 6)

476-Q.* Theory of Brittle Fracture in Steel and Similar Metals. A. H. Cottrell. *AIME Transactions,* v. 212, Apr. 1958, p. 192-203.

Fracture and plastic deformation; theory of the yield point; nucleation of cracks by slip; ductile-brittle transition in unnotched tensile specimens; notch brittleness. (Q26s, Q23r; ST)

477-Q.* Activation Energies for Creep of Single Aluminum Crystals Favorably Oriented for (111) [101] Slip. J. L. Lytton, L. A. Shepard and J. E. Dorn. *AIME Transactions,* v. 212, Apr. 1958, p. 220-225.

Creep of single Al crystals occurs by three unique processes, characterized by three distinct and isolatable activation energies: The 35,000-cal-per-mole activation energy obtained at the highest temperatures was ascribed to a dislocation climb process; the 28,000-cal-per-mole activation-energy process, occurring over the intermediate-temperature range, was attributed to a cross-slip mechanism; and it was suggested that the 3400-cal-per-mole process observed below 400° K. may be the Peierls energy. 17 ref. (Q3, P13a; Al, 14-61)

478-Q.* Effect of Surface Films on Cadmium Crystals. M. Metzger and T. A. Read. *AIME Transactions,* v. 212, Apr. 1958, p. 236-243.

Strengthening effects of hydroxide and synthetic plastic films in the creep of Cd crystals studied. Results were broadly consistent with the naive mechanical model. Dislocation-film reactions and the significance of macroscopic stresses associated with certain films. 29 ref. (Q3, 3-66; Cd)

479-Q. A Method for Observing the Progress of Deformation in Tensile Samples. A. P. Young and L. L. Marsh. *AIME Transactions,* v. 212, Apr. 1958, p. 247-249.

Use of plastic replicas taken from a tensile sample of uranium during testing. Record of deformation can be made as nearly continuous as is desirable by taking replicas at small strain intervals. (Q27, M20r; U)

480-Q.* Ductility of Silicon at Elevated Temperatures. D. W. Lillie. *AIME Transactions,* v. 212, Apr. 1958, p. 249-251.

Considerable ductility exists in bulk specimens of polycrystalline high-purity Si. The possibility of hot forming at 1200° C. is suggested. 5 ref. (Q23p, 2-62; Si)

481-Q.* Observations on Homogeneously Bent Silicon Crystals. U. F. Kocks. *AIME Transactions,* v. 212, Apr. 1958, p. 251-252.

Single slip and a single parallel array of edge dislocations have been obtained in Si single crystals by homogeneously bending them in a four-point dead-loading device at 1000° C. around the [211] axis with [251] as the tensile axis which encloses an angle of 40° with the glide plane. 7 ref. (Q24a, M26b; Si)

482-Q.* The Temperature Dependence of Flow and Fracture in Coated Zinc Single Crystals. L. C. Weiner. *AIME Transactions,* v. 212, Apr. 1958, p. 253-256.

For Zn single crystals, $X_o = 3°$, a surface coating raises both the cleavage and yield strengths over a large temperature range. The "brittle temperature", associated with slip after completion of twinning, does not coincide with the point of intersection of the flow and cleavage curves, which is associated with twinning. A surface film has no effect on the brittle temperature. 9 ref. (Q24, Q23r, Q26s; Zn, 14-61)

483-Q.* Pyramidal Slip in Magnesium. R. E. Reed-Hill and W. D. Robertson. *AIME Transactions,* v. 212, Apr. 1958, p. 256-259.

Slip on $\{1122\}$ planes, which do not contain a close-packed direction, has been identified on crystals strained at −190° C. Evidence also shows that $\{1011\}$ pyramidal slip is a mode of deformation at 25° C. in a limited orientation range. 10 ref. (Q24a; Mg)

484-Q.* Size Effects in the Deformation of Aluminum. R. L. Fleischer and Bruce Chalmers. *AIME Transactions,* v. 212, Apr. 1958, p. 265-274.

Aluminum single crystals and bicrystals of various cross-sectional dimensions were deformed in tension. Typical stress-strain curves; effects of changes in crystal dimensions; effects of growth rate used in preparation of crystals. Macroscopic constraints at a grain boundary are responsible for the most prominent grain-boundary effect, the production of multiple slip. 41 ref. (Q24, M27f; Al, 14-61)

485-Q.* Detection of Fatigue in Metals. R. F. Hanstock. *British Journal of Applied Physics,* Supp. 6, 1957, p. S48-S50.

Brief review of the nature of fatigue and of the methods employed to detect development. Potential value of these methods as primitive nondestructive tests to reveal fatigue in its least dangerous stage (i.e., prior to the development of serious structural weakness). 13 ref. (Q7, 1-54)

486-Q. Structural Changes and Energy Dissipation During Fatigue in Copper. N. Thompson and N. J. Wadsworth. *British Journal of Applied Physics,* Supp. 6, 1957, p. S51-S55.

5 ref. (Q7, M27; Cu)

487-Q. Measurement of Elastic Constants by the Ultrasonic Pulse Method. M. F. Markham. *British Journal of Applied Physics,* Supp. 6, 1957, p. S56-S63.

6 ref. (Q21, 1-74)

488-Q. Alloy Resists Jet Heat. *Chemical and Engineering News,* v. 36, May 19, 1958, p. 48-50.

Nickel-chromium-tungsten alloy can increase operating temperature to 1800° F. (Q-general, 2-62, T24b, 17-57; SGA-h, Ni, Cr, W)

489-Q. Super-Strength Alloys. *Design News,* v. 13, Mar. 1958, p. 100-101, 102.

Chart compiled by ASTM showing chemical composition and rupture strength at 1000 psi. of various alloy systems. (Q3m; SGB-a)

490-Q. Brittle Fracture. G. M. Boyd. *Engineer,* v. 205, Jan. 31, 1958, p. 174-175.

General discussion; conditions under which brittle fracture occurs; effect of temperature and welding and remedial measures. (Q26s)

491-Q. Brittle Fracture in Steel as Related to Flash-Welded Line Pipe. Pt. 2. M. A. Scheil, G. E. Fratcher, S. L. Henry and E. H. Uecker. *Engineering Journal,* v. 41, Mar. 1958, p. 59-63.

Concepts of brittle fracture for 0.20% to 0.30% C, medium Mn steel. 9 ref. (Q26s, T28p; ST, 1-57)

492-Q. A Qualitative Separation of Wear Factors. L. Rozeanu and O. Preotescu. *Engineers Digest,* v. 19, Mar. 1958, p. 102-105. (From *Revue de Mecanique Appliquee,* v. 2, no. 1, 1957.)

Study of adhesive, corrosive, abrasive and fatigue wear. (Q9)

493-Q.* The Structure and Mechanical Properties of High-Purity Aluminum-Zinc-Magnesium Alloys. P. C. Varley, M. K. B. Day and A. Sendorek. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 337-351.

Super-purity-base alloys of Al, Zn and Mg, when quenched from 465° C. and naturally aged, showed a steady improvement in mechanical properties with a decrease in ductility. As the alloying content and the time of aging were raised the fractures became increasingly intercrystalline and brittle. With a standard artificial aging treatment of 16 hr. at 135° C. there was again a steady rise in tensile strength and proof stress with increasing alloying additions, and a maximum was reached with 9% addition. 7 ref. (Q-general, N7a; Al-b, *Zn, Mg*)

494-Q.* . A New Investigation of Anomalies in Chromium. H. Pursey. *Institute of Metals, Journal,* v. 86, Apr. 1958, p. 362-368.

Elasticity measurements on samples of pure and impure Cr from −200 to +150° C. Elastic anomaly is interpreted as a change in volume of the material at a certain temperature, which is a function of the stress on the material. Hence, if the temperature of a specimen is fixed and the stress varied, an anomalous expansion or contraction occurs as the material changes from its modified to its unmodified form. 17 ref. (Q21; Cr)

495-Q. Study of Metal-Working Processes. Non-Homogeneous Deformation of Material. *Iron and Coal Trades Review,* v. 176, Feb. 14, 1958, p. 393-395.

Survey of available methods of studying nonhomogeneous deformation in metals. (Q24f, F-general)

496-Q. Measurements of Quenching Stresses in a Bearing Ring by Interference Fringes. Toshio Mura and

Hiroshi Yoshimoto. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 115-119. 6 ref. (Q25h, J26, T7d)

497-Q. Internal Friction in Aluminum at Low Temperatures. A. J. Filmer, G. J. Hutton and T. S. Hutchison. *Journal of Applied Physics,* v. 29, Feb. 1958, p. 146-148. 7 ref. (Q22, 2-63; Al)

498-Q. Vickers Hardness and Compressive Strength. D. S. Dugdale. *Journal of Mechanics and Physics of Solids,* v. 6, 1958, p. 85-91.

Hardness and compression tests are reported for a wide variety of materials. A simple empirical method for relating hardness number to the stress-strain curve is suggested. The correlation obtained leads to the conclusion that the Vickers test is not at all sensitive to yield stresses corresponding to compressive strains greater than 0.15. 8 ref. (Q29, Q28)

499-Q.* Propagation of Fatigue Cracks in Sheet Specimens. N. E. Frost and D. S. Dugdale. *Journal of Mechanics and Physics of Solids,* v. 6, no. 2, 1958, p. 92-110.

Fatigue tests on mild steel, Al alloy and Cu sheet specimens containing a small central slit. Growth of the fatigue cracks initiated by the slit was measured as the test proceeded. In some of the mild steel specimens a plastic zone was visible around the growing crack. Measurements of the plastic zone showed that a state of geometrical similarity existed between the crack length and plastic zone dimensions. For low stresses the crack growth was sometimes erratic, but the rate of growth was proportional to the current crack length. 14 ref. (Q7; 4-53, 9-72, CN, Al, Cu)

500-Q. Basal Slip in Zinc Under Static and Dynamic Loading. T. Vreeland, Jr., D. S. Wood and D. S. Clark. *Journal of Mechanics and Physics of Solids,* v. 6, no. 2, 1958, p. 111-126.

Stress required to produce a given permanent basal shear strain in single crystals of Zn is much greater under dynamic than static conditions. 10 ref. (Q24a; Zn, 14-41)

501-Q. Effect of Friction on Compression and Indentation Between Flat Dies. J. F. W. Bishop. *Journal of Mechanics and Physics of Solids,* v. 6, no. 2, 1958, p. 132-144. 8 ref. (Q9p, Q28g, W22a)

502-Q.* Factors Affecting Residual Stress in Electrodeposited Metals. Joseph B. Kushner. *Metal Finishing,* v. 56, Apr. 1958, p. 46-51.

Residual stresses in electrodeposited metals vary with deposit thickness. Stress is usually high at first and then diminishes to a constant value in the neighborhood of 0.001 to 0.002-in. deposit. Test runs were made and typical results are plotted. (To be continued.) (Q25h; 8-62)

503-Q.* Factors Affecting Residual Stress in Electrodeposited Metals. Pt. 2. Joseph B. Kushner. *Metal Finishing,* v. 56, May 1958, p. 82-87.

Variation of residual stress with thickness and temperature, effect of current density, and of contaminants and addition agents, regarding deposit of Ni films on Cu. (Q25h; 8-62, Cu, *Ni*)

504-Q.* Creep Properties of Three Copper Alloys. J. McKeown and R. D. S. Lushey. *Metal Industry,* v. 92, Apr. 25, 1958, p. 327-329.

Creep properties of gunmetal (85% Cr, 5% Zn, 5% Sn, and 5% Pb) and 60-40 brass, hot stamped at 700 and 800° C., were examined. Tensile strength, 0.1% proof stress, elongation, Young's modulus, and hardness. (Q3, Q-general; Cu-b)

505-Q.* Alloys of Titanium and Zirconium Containing Tin. R. F. Smart. *Metallurgia,* v. 57, Apr. 1958, p. 181-188.

Literature review. Phase diagram, oxidation resistance, high-temperature strength, creep properties, hardness and other mechanical properties of Zr and Ti alloyed with Sn. 30 ref. (Q-general, M24; Ti, Zr, *Sn*)

506-Q.* "Size" Effects and Their Possible Significance for "Non-Propagating" Cracks in Metal Fatigue. W. J. Harris. *Metallurgia,* v. 57, Apr. 1958, p. 193-197.

Relationship of fatigue strength to an intrinsic block structure or "flaw" pattern in polycrystalline solids. Elements of crystalline slip; significance of intrinsic flaw patterns in explaining "size" effects, and non-propagating effects in fatigue of metals. 15 ref. (Q7)

507-Q.* Coming: Better Thermenol Alloys. W. J. Buehler and C. G. Dalrymple. *Metal Progress,* v. 73, May 1958, p. 78-81.

Iron-aluminum alloys with 3 to 4% Mo have excellent oxidation resistance and stress-rupture strength. With small additions of Zr and carbon to raise the mechanical prop-

erties and inhibit the grain growth, the alloys are useful for many high-temperature applications. 5 ref. (Q-general, P-general; SGA-h, Fe, Al)

508-Q.* Castings for Tougher Jobs. Carl F. Joseph. *Metal Progress,* v. 73, May 1958, p. 104-108.

Pearlitic malleable iron is opening up new horizons for cast parts in automotive and other applications. A new grade of higher hardness has been developed for parts requiring good wear resistance toughness in the as-machined state. Machinable castings, with even higher hardness—up to Brinell 400—are in the future picture.
(Q-general, E11, 17-57; CI-s)

509-Q. Effect of Phosphorus and Manganese on Temper Brittleness. N. V. Tolstoguzov and A. D. Kramarov. (Digest from *Metallovedenie i Obrabotka Metallov,* no. 2, 1957.) *Metal Progress,* v. 73, May 1958, p. 172, 174.

(Q26s, 2-62; ST, *P, Mn)*

510-Q. In the Missile Era Materials Build a New Technology. W. C. Rous, Jr. *Missiles and Rockets,* v. 3, Mar. 1958, p. 91-100.

Operational stress and temperature histories in relation to design requirements.
(Q-general, 2-62, 17-51, T24e, 17-57; Ti, SS)

511-Q. Single-Crystal Elastic Constants of Indium. D. R. Winder and Charles S. Smith. *Physics and Chemistry of Solids,* v. 4, no. 1/2, 1958, p. 128-134.

Elastic constants of tetragonal In as measured by the ultrasonic pulse-echo method. 11 ref. (Q21; In, 14-61)

512-Q. Casting Alloy Enters High-Strength Field. E. G. Opsahl and W. H. Sparing. *Product Engineering,* v. 29, Apr. 28, 1958, p. 84-85.

Wearpact, a special steel, offers advantages in cost and easier fabrication. Properties and design tips.
(Q-general, E25p; 17-51, AY-b)

513-Q.* Tensile Properties of Uranium From Room Temperature to 600° C. N. H. Hancock. *United Kingdom Atomic Energy Authority,* AERE M/R 1156, 1957, 22 p.

Variation from room temperature to 600° C. of proof stress, ultimate tensile strength, Young's modulus and elongation, of two casts of pure uranium and an alloy with 4.9% Mo. Variation of the ratio of Brinell hardness to ultimate tensile strength and proof stresses for the two nominally pure uranium casts. 7 ref. (Q27a, 2-61; U)

514-Q. An Evaluation of Fatigue Properties of Titanium and Titanium Alloys. J. G. Weinberg and I. E. Hanna. Battelle Memorial Institute. (Office of Assistant Secretary of Defense for Research and Engineering.) *U. S. Office of Technical Services,* PB 121631, July 1957, 145 p. $3.75.

Review. (Q7; Ti)

515-Q. Properties of Titanium Alloys at Elevated Temperatures. F. R. Schwartzberg, F. C. Holden, H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute. (Office of Assistant Secretary of Defense.) *U. S. Office of Technical Services,* PB 121634, Sept. 1957, 228 p. $6.

(Q-general; 2-62; Ti)

516-Q. An Investigation of Three Ferritic Steels for High-Temperature Application. A. P. Coldren and J. W. Freeman. University of Michigan. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131069, Apr. 1957, 117 p. $3.

(Q-general, N8, 2-62; SS, SGA-h)

517-Q. Thermal Stresses and Thermal Buckling. J. Singer, M. Anliker and S. Lederman. Polytechnic Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131072, Apr. 1957, 120 p. $3.

(Q25p)

518-Q. Effects of Vibrations on the Yield Strength of a Low-Carbon Steel. G. E. Nevill, Jr., and F. R. Brotzen. Rice Institute. (Air Force Office of Scientific Research.) *U. S. Office of Technical Services,* PB 131260, Apr. 1957, 31 p. $1.

In the 15 to 80 kc. frequency range, applied mechanical vibrations reduce the steady stress necessary to initiate yielding in tension in a low-carbon steel specimen. This decrease in yield strength is proportional to the vibrational amplitude.
(Q23b; CN)

519-Q. Investigation of Materials Fatigue Problems. H. N. Cummings, F. B. Stulen and W. C. Schulte. Curtiss-Wright Corp. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131288, Mar. 1957, 221 p. $5.50.

Fatigue properties of high-strength steels. (Q7; ST, SGB-a)

520-Q. Temperature and Stress Dependence of the Atmosphere Effect on Nichrome V. P. Shahinian and M. R. Achter. Naval Research Labora-

tory. *U. S. Office of Technical Services,* PB 131339, Oct. 1957, 17 p. $.50.

Creep rupture tests were performed on the alloy in vacuum and in air at 1100, 1300, 1500, 1700 and 1900° F. (Q3r, 1-73, 3-66; Cr, Ni)

521-Q. Hydrogen, Crack Initiation, and Delayed Failure in Steel. H. H. Johnson, J. C. Morlet and A. R. Troiano. Case Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131340, May 1957, 52 p. $1.50.

(Q7, 9-72; ST, *H*)

522-Q. Comparison of the Creep-Rupture Properties of Nickel in Air and in Vacuum. P. Shahinian and M. R. Achter. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131344, Oct. 1957, 11 p. $.50.

(Q3r, 1-73, 3-66; Ni-a)

523-Q. Correlation of Literature on the Effect of Testing Temperature on the Mechanical Properties of Wrought Aluminum Base Alloys. H. R. Pritchard. Frankford Arsenal. *U. S. Office of Technical Services,* PB 131346, May 1955, 117 p. $3.

(Q-general, 2-61; Al)

524-Q. Fatigue Investigation on High Strength Steel. J. K. Childs and M. M. Lemcoe. Southwest Research Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131371, July 1957, 44 p. $1.25.

(Q7; ST, SGB-a)

525-Q. Physical Properties of Monolayers Adsorbed at the Solid/Air Interface. Pt. 3. Friction and Durability of Films on Stainless Steel. R. L. Cottington, E. G. Shafrin and W. A. Zisman. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131493, Dec. 1957, 18 p. $.50.

(Q9p, 14-62; SS)

526-Q. Research on the Effects of Stress, Strain, and Temperature on the Eutectoid Decomposition of Titanium Alloys. A. W. Goldenstein, A. G. Metcalfe and W. Rostoker. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131610, Nov. 1957, 72 p. $2.

(Q26s, N9, 2-61, 3-66; Ti, *Cr*)

527-Q.* Plastic Theory of Structures. Pt. 1. T. M. Charlton. *Welder,* v. 27, Jan-Mar. 1958, p. 11-15.

Plastic theory of structures and its application to determination of load-carrying capacity. Formation of plastic hinges in structural members. (To be continued.) (Q23; SGB-s)

528-Q. Brittleness Problem Faced in Ship Welding. Earl Parker. *Western Metalworking,* v. 16, Apr. 1958, p. 44.

(Q26s, T22g; 7-51, ST)

529-Q. Static Strength of Spot-Welded Joints. A. N. Dorofeev. *Avtomaticheskaya Svarka,* v. 9, no. 2, 1956, p. 58-66. (Henry Brutcher, Altadena, Calif., Translation no. 3802.)

Previously abstracted from original. See item 565-Q, 1956.
(Q23, K3, 7-51)

530-Q. Influence of Impurities on the Properties of High-Temperature Strength Nickel-Chromium Alloys. M. V. Pridantsev and G. V. Estulin. *Stal',* v. 17, no. 7, 1957, p. 636-640. (Henry Brutcher, Altadena, Calif., Translation no. 4088.)

Previously abstracted from original. See item 1063-Q, 1957.
(Q-general, 3-69; ST, SGA-h)

531-Q. Effect of Preceding Cold Working and Annealing Upon Initial Stage of Plastic Deformation and Subsequent Recrystallization of Iron. Ya. R. Rauzin. *Metallovedenie i Obrabotka Metallov,* no. 1, Jan. 1958, p. 38-42. (Henry Brutcher, Altadena, Calif., Translation no. 4123.)

Influence of prior plastic deformation by rolling or forging followed by a process anneal upon susceptibility to grain growth, critical strain, etc. Extent to which yield point and yield-point elongation are affected by the amount of initial reduction. Fallacy of current explanation advanced for effect of initial hot or cold working on tendency of steel to grain growth.
(Q24, N3, 3-68; Fe, ST)

532-Q. Ductility of Cold-Rolled Transformer Sheet. A. G. Petrenko. *Stal',* v. 17, no. 5, 1957, p. 453-456. (Henry Brutcher, Altadena, Calif., Translation no. 4134.)

(Q23p; ST, 4-53)

533-Q. Indentors of High Heat Resistance for Hardness Tests on Metals up to 1300° C. in Vacuo. M. G. Lozinskiy and M. B. Guterman. *Zavodskaya Laboratoriya,* v. 22, no. 11, 1956, p. 1358-1363. (Iron and Steel Institute Translation no. 933; Henry Brutcher, Altadena, Calif., Translation no. 4138.)

Previously abstracted from original. See item 344-Q, 1957.
(Q29p, 1-53, 1-73)

534-Q. Mechanical Properties of Some Ultra High Strength Steels. I. V. Paisov and So Yun Ho. *Metallovedenie i Obrabotka Metallov,* no. 2, Feb. 1958, p. 2-6. (Henry Brutcher, Altadena, Calif., Translation no. 4140.)

Development of two structural steels combining very high tensile with satisfactory impact strengths. Chemical composition, hardenability, mechanical properties between room temperature and 30° C.
(Q-general; J5; ST, SGB-a)

535-Q. Characteristics of Fatigue Failure of Alloys at High Temperature. V. A. Parfenov. *Metallovedenie i Obrabotka Metallov,* no. 2, Feb. 1958, p. 19-22. (Henry Brutcher, Altadena, Calif., Translation no. 4148.)

(Q7, 2-62; SGA-h, Ti-b)

536-Q. Mechanical Properties of Electrodeposited Copper as Depending on Electrolysis Conditions and Electrolyte Composition. A. M. Ginberg and Yu. A. Klyachko. *Metallovedenie i Obrabotka Metallov,* no. 2, Feb. 1958, p. 35-37. (Henry Brutcher, Altadena, Calif., Translation no. 4151.)

(Q-general, L17a; Cu, 8-62)

537-Q. Fatigue Strength of Austenitic Steels Exposed to Corrosive Gases at High Temperatures. A. V. Ryabchenko and E. L. Kazimirovskaya. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1958, p. 6-10. (Henry Brutcher, Altadena, Calif., no. 4164.)

(Q7a, R6g, 2-62; SS)

538-Q. (English.) **Problems of Elastic Dislocation and Their Application on Residual Welding Stresses.** Koichi Masubuchi and Toshio Yada. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 23-26.

Utilizes similarities between wing theory in aerodynamics and residual stresses due to welding to explain several hitherto unresolved problems that arise from welding stresses. 6 ref. (Q25h; 7-51)

539-Q. (English.) **Fatigue Life of Metals Under Varying Repeated Stresses.** Toshio Nishihara and Toshiro Yamada. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 61-64.

New criterion on fatigue failure and analytical procedure predicting fatigue life under varying stresses. (Q7b)

540-Q. (English.) **Branch Point of Notched Fatigue Specimens.** Tadasi Isibasi. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 71-73.

7 ref. (Q7a, 1-60)

541-Q. (English.) **Determination of the Distribution of Maximum Shearing Stress on Metal Surfaces by Means of Electroplating Method.** Hirosi Watanabe. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 103-106.

Method consists of observing continuous growth of strain figures due to formation of flecks appearing on surface of electroplated Cu subjected to fatigue. (Q2j, Q7; Cu, 8-12)

542-Q. (English.) **Measurement of Residual Stress by Gunnert's Method.** Hirosi Watanabe. *Sixth Japan National Congress of Applied Mechanics, Proceedings,* Mar. 1957, p. 107-110.

Effects of variations of supporting conditions of Gunnert's tensometer; some methods to make errors minimum. 8 ref. (Q25h, 1-54)

543-Q. (English.) **Measurements of Quenching Stresses in Rings.** Toshio Mura. *Sixth Japan National Congress of Applied Mechanics, Proceedings,* Mar. 1957, p. 111-115.

8 ref. (Q25, 1-54, J26)

544-Q. (English.) **Studies of Plastic Deformation by the Photoplastic Method.** Masataka Nisida, Minoru Hondo and Taizo Hasunuma. *Sixth Japan National Congress of Applied Mechanics, Proceedings,* Mar. 1957, p. 137-140.

Theoretical solutions for elastic-plastic problems in which a portion of material is plastic and remainder elastic. (Q24, Q21)

545-Q. (English.) **Influence of Stress Change on the Primary Creep of Low-Carbon Steel.** Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Kiyotsugu Ohji. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 213-216.

Creep tests made under pulses of constant stresses at fixed temperature of 450° C. A theory is projected on mechanism of creep. 4 ref. (Q3r, 3-66; CN)

546-Q. (English.) **Anisotropy of 70-30 Brass and Aluminum.** Moriya Oyane, Yoshinori Tsunekawa and Kohei Kojima. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 217-220.

Influence of work hardening, Bauschinger effect, rolling and recrystallization textures, and deformed shapes of the crystal grains. (Q24g; Al-b; Cu-n)

547-Q. (English.) **Investigation on the Dynamic Creep Rupture of Materials.** Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Ryoichi Koterasawa. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 221-224.

Analysis of stress range diagram of dynamic creep rupture on basis of results concerned with fracture of low-carbon steel at elevated temperature under alternating stress. 4 ref. (Q3m, 2-62; CN)

548-Q. Mechanism of Friction Between Metal Surfaces. Pt. 1. Influence of Surface Roughness. Gennosuke Yoshimoto and Tadasu Tsukizoe. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 235-238.

(Q9p)

549-Q. (English.) **Fatigue Fracture Criterion in Metals Based on Dislocation Theory.** Takeo Yokobori. *Tohoku University, Technology Reports,* v. 22, no. 1, 1957, p. 51-61.

Study of unique dislocation model of fatigue fracture so as to clarify the micromechanism of fatigue damage in early stages. 21 ref. (Q7, M26b)

550-Q. (French.) **Creep Characteristics of Steels for Gas Turbines.** C. Roques, Ch. Dubois and P. Bastien. *Revue de Metallurgie,* v. 55, Mar. 1958, p. 227-242.

21 ref. (Q3, W11m, 17-57; ST)

551-Q. (French.) **A Statistical Presentation of Fatigue Test Results.** J. Strebelle. *Revue de la Soudure,* v. 14, no. 1, p. 24-32.

(Q7, S12)

552-Q. (French.) **Results of Fatigue Tests on Butt-Welded Joints in Different Countries.** R. Cazaud. *Revue de la Soudure,* v. 14, no. 1, p. 49-50.

(Q7; 7-51)

553-Q. (French.) **Fatigue Failure Results on Fatigue Test Machine.** W. H. Munse. *Revue de la Soudure,* v. 14, no. 1, p. 59-62.

Fatigue failures of actual structures could furnish more realistic information than laboratory fatigue tests if sufficient indication is given as to forces, stresses and numbers of load cycles. Fatigue cracks recently observed on two 90-ton fatigue test machines constructed in 1940 and used at the University of Illinois. Concluded that soldered beams under bending stress subjected to more than several million load cycles may fail under relatively small nominal maximal stresses. Need for further study of the effect of residual stresses, and pre-existing microscopic flaws on the weld failure. (Q7k; 7-51)

554-Q. (German.) **Plastic Deformation of Carbides.** E. Bryjak, etc. *Fertigungstechnik,* v. 8, Feb. 1958, p. 60-65.

Tungsten carbides with Co content up to 25% were investigated under the action of applied stresses on special equipment. Diameter and depth of deformation; metallographic examination, X-ray studies. Results on carbides with Co content under 10% apparently refute the theory supported by Dawihl that no permanent distortion occurs. 16 ref. (Q24; W, 6-69)

555-Q. (German.) **Heat Resisting and Ultra-High Strength Steels.** Lueb. *Fertigungstechnik,* v. 8, Feb. 1958, p. 66-69.

4 ref.
(Q-general, 2-62; ST, SGA-h, SGB-a)

556-Q. (German.) **Semi-Automatic Hardness Testing.** Kurt Potyka. *Werkstatt und Betrieb,* v. 91, May 1958, p. 271-272.

Partly automatic Rockwell hardness tester, the test pressure being exerted by an integrated pedal-operated motor. (Q29, 1-53)

557-Q.* (Japanese.) **Coefficient of Dry Friction of Metals.** Riitsu Takagi and Yuko Tsuya. *Journal of Mechanical Laboratory,* v. 12, Jan. 1958, p. 12-17.

To eliminate lubricating properties of thin oxide surface films specimens of Cu, Fe, Ni, Mo, W and Sn were heated in a vacuum for hydrogen atmosphere before tests. Coefficient of friction of metals sliding on similar metals were measured at room temperatures in vacuum or hydrogen atmosphere. 7 ref. (Q9p; Cu, Fe, Ni, Mo, W, Sn)

558-Q.* (Japanese.) **On Indentation Hardness Testing. Pt. 1.** Shigehiko Yazawa, Masao Unno, Iwakichi Sawano and Shigeru Yamamoto. *Journal of Mechanical Laboratory,* v. 12, Jan. 1958, p. 18-21.

Indentation hardness measurements on steel blocks partially plated with Zn, Cu, Ni or Sn 1 micron thick. Plated portions gave smaller hardness numbers than unplated portions of the block. Variations due to differences of friction between indenter and surfaces of the blocks. (Q29b)

559-Q.* (Japanese.) **Ball Indentation. Pt. 1. Experiments on Specimens of Definite Dimensions.** Shigehiko Yazawa, Kiyoshi Sato, Masao Unno, Masayoshi Tsutsumi and Go Yaguchi. *Journal of Mechanical Laboratory,* v. 12, Jan. 1958, p. 22-30.

Steel balls under various loads used for indenting annealed steel specimens containing 0.19 and 0.24% C. Luders' lines on the surfaces of specimens and recorded profiles of impressions. Concluded that index and constants are functions of the friction between indenter and specimen surfaces. 5 ref. (Q29b; CN)

560-Q. (English.) **Experimental Study on the Static Strength of Perforated Strips and Riveted Joints of Commercially Pure Titanium.** Shoji Shimamura and Yusei Noguchi. *Journal of Mechanical Laboratory of Japan,* v. 3, no. 2, 1957, p. 95-96. (From *Journal of Mechanical Laboratory,* v. 11, 1957, p. 194.)

Previously abstracted from original. See item 270-Q, 1958. (Q27; Ti)

561-Q. (Japanese.) **Relation Between Actual Grain Size and Fatigue Strength of Axle Steels for Rolling Stock.** Rikuo Inoue. *Sumitomo Metals,* v. 9, Oct. 1957, p. 216-220.

(Q7a, M27c, T7j; ST)

562-Q.* (Russian.) **Mechanism of Failure in Alloy EI437 When Exposed to Prolonged Strain at Elevated Temperatures.** S. T. Kishkin and A. A. Klipin. *Metallovedenie i Obrabotka Metallov,* Dec. 1957, p. 36-40.

Fissures originate and develop at 700-800° C. under prolonged action of static load exclusively at the grain boundaries normal to the acting force. This is an indication of weakness at the grain boundary. More rapid failure under repeated heating and cooling is caused by intensive development of cracks. 5 ref. (Q26, 2-62, SGA-h)

563-Q. (Russian.) **Strengthening of Technical Aluminum by Cold Drawing.** Marius Protopopesku. *Revue de Métallurgie (Bucarest),* v. 2, 1957, p. 91-106.

(Q23a, G4; Al-b)

564-Q. (Russian.) **Comparison of Metal-Ceramic and High Alloy Steel Cutting Tools.** V. Ya. Rassokhin and M. A. Pura. *Stanki i Instrument,* Feb. 1958, p. 12-14.

6 ref. (Q-general; TS, 6-70, SGA-j)

565-Q. (Russian.) **Research on Ball and Roller Bearings.** N. A. Spitsyn. *Vestnik Mashinostroeniya,* v. 38, Mar. 1958, p. 3-8.

Study of heat and wear resistant steels most suitable for bearings. (Q-general, Q9n; ST, SGA-d)

566-Q. (Russian.) **Strength and Wear Resistance of Ball and Roller Bearing Components.** S. V. Pinegrin. *Vestnik Mashinostroeniya,* Mar. 1958, p. 8-11.

Use of Ni and Cr alloys for bearings operating under high temperatures.
(Q27a, Q9n, T7d; Cr-b, Ni-b, SGA-d)

567-Q. (Russian.) **Seizing of Piston Rings in Diesel Engine of Locomotive D-50.** K. A. Grekov. *Vestnik Mashinostroeniya,* v. 38, Apr. 1958, p. 16-19.

(Q9p, T23n, T7)

568-Q. (Spanish.) **When Is Hammering Required to Obtain Optimum Results With Respect to Deformation and Residual Stresses in Welds?** R. Gunnert, H. Alida and L. Heiling. *Ciencia y Tecnica de la Soldadura,* v. 8, Jan-Feb. 1958, 16 p.

Tests were conducted at Chalmes Technological University, Gothenburg, on electric welded extra-low-carbon steel sheet; effects of variables such as weight of hammer, blows per minute, number of passes, length of electrode. 3 ref.
(Q25h, G23n; ST, 4-53, 7-51)

569-Q. Thermal Creep Design Criteria. Robert Goldin. *Aeronautical Engineering Review,* v. 16, Dec. 1957, p. 36-41.

7 ref. (Q3, T24, 17-51)

570-Q.* **Direct Stress Fatigue Tests on Redux-Bonded and Riveted Double Strap Joints in 10 S.W.G. Aluminum Alloy Sheet.** S. Kelsey and J. B. Spooner. *Aeronautical Research Council,* C.P. no. 353, Dec. 1955, 48 p.

Bonded joints tended to fail by shear of the bond at the higher stress ranges and by tension of the sheet at the lower stress ranges. Riveted joints failed by tension across the first row of rivets in all cases, though tests on three-row riveted joints showed considerable improvement in endurance over those with two rows of rivets. Endurances were greater for bonded joints but with rather more scatter than for riveted joints, particularly where bond shear was the cause of failure.
(Q7d; Al-b, 4-53, 7-53, 7-58)

571-Q.* **Modern Concepts of Flow and Fracture.** Earl R. Parker.

American Society for Metals, Transactions, v. 50, 1958, p. 52-104.

The 1957 Edward De Mille Campbell Memorial Lecture. 71 ref. (Q26, Q25, Q24)

572-Q. Probability Theory of Fatigue. A. Ferro and R. Colombo. *Engineers' Digest,* v. 18, Nov. 1957, p. 487-490. (From *Metallurgia Italiana,* no. 7, 1957, p. 518-522.

Previously abstracted from original. See item 1053-Q, 1957. (Q7, S12)

573-Q.* Factors Influencing the Resistance of Steel Castings to High Stress Abrasion. T. E. Norman. *Modern Castings,* v. 33, May 1958, p. 89-98.

Study of martensitic, pearlitic and austenitic steels, mainly with high carbon contents. In general the martensitic steels had better abrasion resistance than the pearlitic steels. A wide range of abrasion factors is possible for each microstructure, depending on such factors as carbon content, austenitizing temperature, tempering temperature, alloy content and the fineness and resultant hardness of the pearlitic structure. 11 ref. (Q9n; CI, 5-60)

574-Q. Study of the Impact Behavior of High-Temperature Materials. H. B. Probst and H. T. McHenry. *National Advisory Committee for Aeronautics* TN 3894, Mar. 1957, 23 p.

The impact properties of titanium-carbide-base cermets, some high-temperature alloys and the intermetallic, NiAl, were obtained at room and elevated temperatures to 1750° F. The impact energies of cermets were found to increase with increased amounts of metallic binder. (Q6; SGA-h, 6-70)

575-Q. Rupture Strength of Several Nickel-Base Alloys in Sheet Form. J. H. Dance and F. J. Clauss. *National Advisory Committee for Aeronautics* TN 3976, Apr. 1957, 24 p.

(Q3m; Ni-b, 4-53)

576-Q. Tensile Properties of Aircraft-Structural Metals at Various Rates of Loading After Rapid Heating. Pt. 3. W. P. Roe and J. R. Kattus. Southern Research Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131511, Sept. 1957, 94 p. $2.50.

Effects of variations in strain rate and holding times on tensile properties of several aircraft structural sheet metals after heating within 10 sec. to test temperatures approaching the melting points of the alloys involved. (Q27, Q21a, P10d, T24a; SS, Ni-b, Ti-b, Al-b, Co-b, 4-53)

577-Q. Determination of the Tensile, Compressive and Bearing Properties of Ferrous and Nonferrous Structural Sheet Materials at Elevated Temperatures. D. E. Miller. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131595, Dec. 1957, 102 p. $2.50.

Data on aluminum, magnesium, titanium, stainless steel and alloy steel. (Q27, Q28, T24a, 2-62; Al-b, Mg-b, Ti-b, SS, ST, 4-53)

578-Q. Study of the Metallurgical Properties That Are Necessary for Satisfactory Bearing Performance and the Development of Improved Bearing Alloys for Service Up to 1000° F. G. K. Bhat and A. E. Nehrenberg. Crucible Steel Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131609, Nov. 1957, 73 p. $2.

Research aimed at obtaining such material properties as hot hardness, compressive yield strengtn, resistance to softening, and structural and dimensional stability. Twenty-nine steels were examined, ranging in type from SAE 52100 and its modifications, to hot work and other toolsteels. (Q-general, Q9p, 2-62; AY, SGA-c)

579-Q. Effect of Strain Hardening on Mechanical Properties of Carbon Steels. I. V. Kudryavtzev, T. V. Naumova and L. M. Rozenmann. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 2-6. (Henry Brutcher, Altadena, Calif. Translation no. 4171.)

Investigation on strain hardening using torsion method. Change of mechanical properties with increasing deformation and effect of heat treatment. Effect of strain hardening on fatigue strength. (Q-general, 3-68; CN)

580-Q. Study of Titanium-Stabilized 18% Cr, 12% Ni Steel for High-Pressure Steam Piping in Power Stations. A. S. Helman, T. S. Griboyedova, E. A. Davidovskaya, B. I. Lazarev, K. V. Lyubavsky, E. S. Slepak, I. I. Trunin and G. P. Fedortzov-Lutikov. *Metallovedenie i Obrabotka Metallov,* v. 4, Mar. 1958, p. 16-24. (Henry Brutcher, Altadena, Calif., Translation no. 4173.)

Effect of heat treatment and strain hardening on mechanical properties of steel; effect of aging; thermal fatigue; corrosion cracking; effect of arc welding. Optimal composition and optimal heat treatment. (Q-general; W11g, W13h, SS)

581-Q. Long-Term Creep and Aging Tests on Steels LA 1 and EI 257. M. I. Solonoutz. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 30-34. (Henry Brutcher, Altadena, Calif., Translation no. 4174.)

Composition of steels; alterations of structure and of composition of carbide phase; alteration of mechanical properties. (Q3, N7a; ST)

582-Q. Temporary Change in Mechanical Properties of Steel During Structural Transformations. V. G. Vorobyov. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 35-38. (Henry Brutcher, Altadena, Calif., Translation no. 4175.)

Increase of plasticity is dependent on phase or structural transformations. Experiments performed at conditions excluding diffusion of atoms. Effect of pretreatment on the development of superplasticity; probable mechanism of the phenomenon; practical importance of superplasticity. (Q23, N8; ST)

583-Q.* Medium and Low-Tungsten High Speed Steels Alloyed With Cobalt. M. S. Chaadayeva. *Metallovedenie i Obrabotka Metallov,* Mar. 1958, p. 48-53. (Henry Brutcher, Altadena, Calif., Translation no. 4177.)

Composition of experimental steels. Methods of treatment and their effect on mechanical properties. Metallographic study. Testing of cutters made from experimental steels. (Q-general, 2-60, TS-m)

584-Q. (French.) **Contribution to the Study of Wear of Carbide Metal Tools.** M. Lainey Broida. *Métaux Corrosion-Industries,* v. 33, Feb. 1958, p. 71-84.

Influence of cutting temperature, speed, cutting angle, cutting force and time on the rate of wear of carbide cutting tools. (Conclusion.) (Q9, G17, T6n; 6-69)

585-Q.* (French.) **Brittle Fracture of Steels.** W. Felix and Th. Geiger. *Métaux Corrosion-Industries,* v. 33, Feb. 1958, p. 85-99.

Photomicroscopic and X-ray studies of the initiation and progress of brittle rupture produced in notched test specimens of a soft steel and of a steel alloyed with C, Si, Mn, Cr an Cu. Results are compared, through spectrographic examination and microhardness measurements, with observations on a furnace I-beam that failed in brittle fracture after 30 years. It is concluded that the deformation and orientation of the ferrite crystals are determining factors in the deformation and rupture processes. (Q26s; ST)

586-Q. (French.) **Hot Strength of Brazed Joints Made With Various Filler Materials.** Bernard Blanchet. *Soudage et Techniques Connexes,* v. 12, Mar-Apr. 1958, p. 101-106.

(Q2g, 2-62, 7-52; SGA-f)

587-Q. (French.) **Problem of Residual Stresses and Risks of Brittle Failure in Welded Constructions.** H. Gerbeaux. *Soudage et Techniques Connexes,* v. 12, Mar-Apr. 1958, p. 109-141.

48 ref. (Q25h, Q26s; ST, 7-51)

588-Q.* (French.) **Report of Fatigue Failures in Fatigue Machines.** W. H. Munse. *Soudage et Techniques Connexes,* v. 12, Mar-Apr. 1958, p. 148-151.

Description of cracks encountered in testing machines at the University of Illinois. Failures occurred when the equipment was 11 years old (after about 500,000,000 cycles on flexural members). Residual stresses in the welds may be responsible, and the existence of small cracks in the weld bead may serve to initiate the failures. (Q7, 7-51)

589-Q. (German.) **Velocity of Sound as a Characteristic Value for Assessing the Properties of Cast Iron.** Rolf Ziegler and Richard Gerstner. *Giesserei,* v. 45, Apr. 10, 1958, p. 185-193.

Dependency of velocity on modulus of elasticity. 9 ref. (Q21a, S14g; CI)

590-Q.* (German.) **Some Observations on Hard Metals for Use in Mining.** F. Kölbl. *Planseeberichte für Pulvermetallurgie,* v. 6, Apr. 1958, p. 22-26.

Hardness ranges of tungsten carbide-cobalt compositions suitable for coal, ore and rock drilling tools. Other material constants (elasticity constant and the compression and bending strengths) must be taken into account. 11 ref. (Q29n, Q-general, T28; W, *Co,* 6-69)

591-Q. (Italian.) **Cast Chromium-Nickel Austenitic Stainless Steels.** *Nickel,* Feb. 1958, p. 9-12.

Mechanical and physical properties, applications of A.C.I. CF-8 and CF-20 steels, to which Italian steels X10CN188 and X17CN188 correspond. (Q-general, P-general, 17-57; SS)

592-Q. (Rumanian.) **Study of Hardening During Cold Drawing of Commercial Aluminum.** Marius Protopopescu. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 9-22.

13 ref. (Q23a, G4; Al-b)

593-Q. (Russian.) **Fatigue Tests for Large Gears.** M. M. Kobrin and G. Z. Zaitsev. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 193-197.

6 ref. (Q7, T7a)

594-Q. (Russian.) **Investigation of Steel Embrittlement.** K. M. Pogodina-Alekseeva and G. I. Pogodin-Alekseev. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 198-201.

(Q26s; ST)

595-Q. (Russian.) **Determination of Heat Resistance of Sheet Steel.** M. Ya. L'lvovskii and I. A. Smiyan. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 202-203.

(Q-general, 2-61; ST, 4-53)

596-Q. (Russian.) **Testing Heat Resistant Sheet Steel and Alloys.** M. V. Pridantsev and A. R. Krylova. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 204-205.

(Q-general, 1-54, 2-61; ST, 4-53)

597-Q. (Russian.) **Improvements in Measurement of Deformation by Determination of Tension in Thin-Walled Tubes.** G. A. Deryagin. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 206-208.

(Q24, Q27, 4-60)

598-Q. (Russian.) **Device for Measurement of Endurance Strength of Metals.** V. N. Gulyaev and A. V. Ratner. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 226-228.

4 ref. (Q7, 1-53)

599-Q. (Russian.) **Determination of Fatigue Strength of Metals in an Active Liquid Medium.** A. I. Yatsyk and F. P. Yanchishin. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 229-230.

(Q7)

600-Q. (Russian.) **Preparation of Complex Models for Optical Investigation of Stress.** T. D. Maksutova and S. P. Shikhobalov. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 231-233.

7 ref. (Q25, 1-52, 17-56)

601-Q. (Russian.) **Use of Partitioned Sieve to Study Effect of Stress on Plastic Deformation of Steel.** I. A. Razov and E. M. Shevandin. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 317-324.

7 ref. (Q24, 3-66; ST)

602-Q. (Russian.) **Fatigue Tests and Durability of Metals.** S. V. Serensen, V. P. Kogaev, M. N. Stepnov and E. V. Giatsintov. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 324-329.

10 ref. (Q7)

603-Q. (Russian.) **Determination of Resistance of Steel Parts to Buckling Under High Temperatures.** M. P. Markovets and V. P. Tret'yakov. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 329-330.

Alloys offer greater resistance to buckling than steel at temperatures of 700 to 800°. (Q28, 6-62; ST)

604-Q. (Russian.) **Determination of Endurance Limits of Mild Steels and Alloys.** N. M. Rudnitskii. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 331-332.

4 ref. (Q7, 1-54; ST)

605-Q. (Russian.) **Testing Cohesive Strength of Bimetallic Antifriction Coating to the Base Metal.** Yu. Ya. Zil'berg. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 335-338.

(Q10c, L17)

606-Q.* **New Steel for Aircraft and Missiles.** *British Steelmaker,* v. 24, Mar. 1958, p. 77-79.

Armco PH 15-7 Mo, a new and higher strength precipitation hardening stainless steel, possesses an outstanding combination of room-temperature and elevated-temperature mechanical properties. It is readily fabricated in the annealed condition, can be hardened by low-temperature heat treatments with minimum distortion, and exhibits good corrosion resistance.
(Q-general, 2-62, T24; SS)

607-Q. **Percussion Drill Steel Life. Pt. 1. What Are the Factors?** Lloyd E. Antonides. *Engineering and Mining Journal,* v. 158, Nov. 1957, p. 90-97.

Ways to combat failure of drill rods caused by fatigue in surface layers from tension stresses. 26 ref.
(Q7, W28; TS)

608-Q.* **Ductile Stainless Work Hardens for Extra Strength.** *Iron Age,* v. 181, May 29, 1958, p. 88-89.

New, nitrogen-containing stainless work hardens but has better ductility than Type 301. Produced in sheet and strip, it has a wide range of application in the extra-full-hard condition.
(Q23a, Q23p; SS, *N*)

609-Q. **Structural Problems in Hypersonic Flight.** Samuel B. Batdorf.

Jet Propulsion, v. 27, Nov. 1957, p. 1157-1161.

12 ref. (Q25, Q-general; T24a)

610-Q.* Creep, Stress-Relaxation, and Metallurgical Properties of Steels for Steam-Power Plant Operating With Steam Temperatures Above 950° F. (510° C.) A. I. Smith, E. A. Jenkinson, D. J. Armstrong and M. F. Day. Digest from ASME Annual Meeting, Paper 57-A-225, Oct. 1, 1958. *Mechanical Engineering,* v. 80, Mar. 1958, p. 112-113.

Steels investigated were types suitable for turbine casing bolts, steam pipes, superheater tubes and cast components. They included Mo-V, Cr-Mo-V, Cr-Mo, and Cr-Ni-Cb (18-12-1). Methods of manufacture, chemical analyses, heat treatments and mechanical properties. (Q3m, Q-general, 2-62; AY, SS)

611-Q.* Creep Properties of Austenitic Nickel: Chromium Steels Containing Niobium. W. H. Bailey, M. G. Gemmill, H. W. Kirkby, J. D. Murray, E. A. Jenkinson and A. I. Smith. Digest from ASME Annual Meeting, Paper 57-A-254, Oct. 1, 1958. *Mechanical Engineering,* v. 80, Mar. 1958, p. 113.

Data relate to 16 heats of steel. On a rupture basis, the tests extend up to 8000 hr. at 1022° F., 42,000 hr. at 1202° F., 26,000 hr. at 1292° F., and 20,000 hr. at 1382° F. On the basis of 1% plastic strain data extend up to 32,000 hr. at 1112° F., 30,000 hr. at 1202° F., 12,000 hr. at 1292° F., and 14,000 hr. at 1382° F. Tests relate to wrought bars of small diameter (⅝ to 1 in.) and to a rotor forging. (Q3m, SS)

612-Q.* Croloy 15-15N. An Austenitic Heat-Resistant Alloy for Severe Tubular Applications at Elevated Temperatures. J. F. Ewing. Digest from ASME Annual Meeting, Paper 57-A-205, Oct. 1, 1958. *Mechanical Engineering,* v. 80, Mar. 1958, p. 113-114.

New alloy was developed for applications requiring strength properties in the 1200-1500° F. range. Chemical composition of Croloy 15-15N is similar to AISI Type 316 (16 Cr, 13 Ni, 3 Mo). Tungsten together with Mo and Cb-Ta has been added to a 15 Cr-15 Ni base for strengthening. Short-time tensile, creep-rupture, and creep properties of Croloy 15-15N. (Q3, Q27; SS)

613-Q.* Concentrated Wear of Turning Tools. V. Solaja. *Research,* v. 11, Apr. 1958, p. 152-156.

Concentrated tool wear in the form of grooves at boundaries of contact between tool and workpiece; effect of groove formation on surface finish; causes of concentrated tool wear, relation to fatigue. 24 ref. (Q9, T6n)

614-Q.* On the Contact Resistance Between Surface-Oxidized Metals in Repeated Sliding. Yasukatsu Tamai. *Wear,* v. 1, Apr. 1958, p. 377-383.

Steel and copper studied under natural and surface-oxidized conditions. With steel the trace of contact resistance during sliding fluctuated in both cases, but with Cu it was either smooth or fluctuating under natural or oxidized condition, respectively. Influence of oxygen content in the atmosphere on the nature of the oxide layer was also studied with tin. 4 ref. (Q9p; ST, Cu)

615-Q.* Report on Papers on Wear Presented at the Institution of Mechanical Engineers Conference. F. T. Barwell. *Wear,* v. 1, Apr. 1958, p. 418-445.

Discussion of conclusions reached in 40 papers read at the conference on lubrication and wear, London, England, October 1957. Subjects include wear, test methods, surface films, effect of temperature and environment, fretting and wear in engines. 10 ref. (Q9)

616-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 1. Long Period Fatigue Tests on a Ferritic and an Austenitic Steel at 500-650° C. Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 311-316. (Iron and Steel Institute Translation no. 574.)

Previously abstracted from original. See item 964-Q, 1957. (Q3, Q7, 2-62; AY, SGA-h)

617-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 2. Procedure for Analysis. Gerhard Bandel and Henning Gravenhorst. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 253-258. (Iron and Steel Institute Translation no. 587.)

Previously abstracted from original. See item 960-Q, 1957. (Q3, 1-54)

618-Q. Solution of Some Problems of Fatigue Strength by the Step-Test Method. Hans Buhler and Walter Schreiber. *Archiv für das Eisenhüttenwesen,* v. 28, Mar. 1957, p. 153-156. (Iron and Steel Institute Translation no. 588.)

Previously abstracted from original. See item 719-Q, 1957.
(Q7e, Q25k; ST)

619-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 3. Results of Creep Tests on Ferritic Tube Steels. Eduard Jahn. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 259-267. (Iron and Steel Institute Translation no. 593.)

Previously abstracted from original. See item 961-Q, 1957.
(Q3, 1-54, 1-60; AY)

620-Q. Vapor Pressure Experiments on Fe-Cr Alloys. Karl Bungardt. *Archiv für das Eisenhüttenwesen,* v. 27, Nov. 1956, p. 715-724. (Iron and Steel Institute Translation no. 618.)

Previously abstracted from original. See item 238-Q, 1957.
(Q22, 1-53, P12c, Fe, *Cr*)

621-Q. Effects of Nitrogen Linkage With Aluminum on the Properties of Steels. Hans J. Wiester. *Stahl und Eisen,* v. 77, June 13, 1957, p. 773-784. (Iron and Steel Institute Translation no. 643.)

Previously abstracted from original. See item 721-Q, 1957. (Q-general, M27c, 2-60; ST, SGB-a, *N, Al*)

622-Q. The Tendency of Steels to Brittle Fracture, as a Function of the Stress State and Temperatures. Albert Kochendorfer and Herbert Scholl. *Stahl und Eisen,* v. 77, July 25, 1957, p. 1006-1018. (Iron and Steel Institute Translation no. 646.)

Previously abstracted from original. See item 828-Q, 1957.
(Q26s, Q6, 1-54; ST)

623-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Organization and Conduct of Tests. Helmut Reiner. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 247-252. (Iron and Steel Institute Translation no. 673.)

Previously abstracted from original. See item 959-Q, 1957.
(Q3, 1-53, 1-54, 1-60)

624-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 4. Results of Creep Tests on Ferritic Engineering Steels. Helmut Holdt. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 269-285. (Iron and Steel Institute Translation no. 574.)

Previously abstracted from original. See item. 962-Q, 1957.
(Q3, 2-62, 2-60; AY)

625-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 5. Results of Creep Tests on Austenitic Steels and Alloys. Karl Bungardt. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 287-304. (Iron and Steel Institute Translation no. 675.)

Previously abstracted from original. See item 963-Q, 1957.
(Q3, 2-62, 2-60; AY)

626-Q. Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Pt. 8. Some Preliminary Deductions. Rudolf Schinn. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 317-323. (Iron and Steel Institute Translation no. 677.)

Previously abstracted from original. See item 695-Q, 1957.
(Q3m, 2-62; ST)

627-Q. 100,000 Hr. Creep Tests at 500° C. on Various Types of Steel. August Thum. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 325-337. (Iron and Steel Institute Translation no. 747.)

Previously abstracted from original. See item 966-Q, 1957.
(Q3, 1-54; AY)

628-Q. On the Conversion of Creep Values to Other Temperatures. Alfred Krisch and Wolfgang Wepner. *Archiv für das Eisenhüttenwesen,* v. 28, May-June 1957, p. 339-344. (Iron and Steel Institute Translation no. 748.)

Previously abstracted from original. See item 967-Q, 1957.
(Q3, 1-54)

629-Q. Mechanical Properties of Some Ultra High Strength Steels. I. V. Paisov and Zo Yun Kho. *Metallovedenie i Obrabotka Metallov,* Feb. 1958, p. 2-6. (Henry Brutcher, Altadena, Calif., Translation no. 4140.)

The addition of tungsten to Cromansil steel increases its impact strength and resilience and makes it more suitable for machine parts. 6 ref. (Q-general, Q6, Q21, 2-60; AY, *Cr, Mn, Si, W*)

630-Q. Stress-Rupture Strength of Welds at High Temperature. A. V. Stanyukovich and V. K. Zemzin. *Metallovedenie i Obrabotka Metallov,* Feb. 1958, p. 12-18. (Henry Brutcher, Altadena, Calif., Translation no. 4147.)

(Q3m, 2-62; ST, 7-51)

631-Q. (English.) Internal Friction and Imperfections in Copper. D. H. Niblett and J. Wilks. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 23-30.

Recent measurements on cold worked Cu and the information they reveal regarding behavior of both

dislocations and point defects. 7 ref. (Q22, M26s; Cu)

632-Q.* (English.) **Scratch Hardness. Pt. 1. Relation to Cold Working.** Tomiya Sutoki and Takeo Hikage. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 10, Apr. 1958, p. 85-96.

Scratch hardness was measured on single crystals and polycrystals of several metals. When the metal was cold worked, the change in the scratch width was very small, whereas indentation hardness conspicuously changed. Scratch hardness was considered to be related rather to the annealed state than to the extremely worked state of a metal. 6 ref. (Q29d, 3-68)

633-Q.* (English.) **Young's Modulus and Grain Size in Nickel-Copper Alloys.** Yuki Shirakawa and Ken'ichi Numakura. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 10, Apr. 1958, p. 110-119.

Young's modulus and the grain size have been measured in ten specimens of polycrystalline ferromagnetic Ni-Cu alloys annealed at 700, 800, 900, 1000 and 1100° C. With the addition of Cu, Young's modulus of Ni with comparatively small grains increased, whereas that with comparatively large grains decreased. (Q21a, M27c, 2-60; Ni, *Cu*)

634-Q. (French.) **High-Temperature Steels and Alloys.** P. Villian. *Metallurgie et la Construction Mecanique,* v. 90, May 1958, p. 345, 347-349, 351, 353, 355, 357-358.

Properties and high-temperature behavior of Fe-Cr, Fe-Ni-Cr and Ni-Cr alloys.
(Q-general, 2-62; SS, SGA-h)

635-Q.* (German.) **Torsion Fatigue Strength of Some Heat Treating Steels After Inductive Surface Hardening.** Franz Bollenrath. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 801-806.

Structure, Vickers hardness and torsion fatigue strength were tested over the entire cross section of specimen. Depth of hardening was from 0.16 to 3.5 mm. Fatigue strength rises with increasing depth. At depths up to 2.2 mm. however, the fatigue strength is lower than after annealing without surface hardening. 11 ref. (Q7h, 2-64; ST)

636-Q.* (German.) **Observation on the Velocity of Sound in Iron-Chromium-Carbon Alloys.** Alfred Fiedler. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 825-830.

Measurements on the velocity of sound were carried out on some Fe-Cr-C alloys by means of the supersonic-impulse-echo-method (water-interferometer). Results show a definite relation between sound velocity and carbon content. Formation of carbides and heat treatment seem to be of strong influence. 6 ref. (Q21f; Fe, *Cr*)

637-Q. (German.) **Importance of the Elastic Properties of Spheroidal Graphite Cast Iron in the Construction of Machines.** Cornelio Gianola. *Giesserei,* v. 45, Apr. 24, 1958, p. 210-219.

4 ref. (Q21a, Q21b, Q23; CI-r)

638-Q. (German.) **Construction, Method of Use and Range of Applicability of a New Bend Test Apparatus.** Walter Köhler. *Werkstoffe und Korrosion,* v. 9, Apr. 1958, p. 216-227.

28 ref. (Q5, 1-53)

639-Q.* (German.) **Influence of Alloying Additives on the Friction Properties of Sintered Copper.** Wilhelm Hofmann and Gerhard Pieper. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 80-86.

A special testing fixture for radial pressure application was designed. Friction forces were recorded and wear was determined gravimetrically and related to friction energy. Sintering pressure and temperature have no influence. Additions such as Sn, Zn, Fe and clay resulted in considerable wear and a high noise level. Raising Pb content decreased the noise. Copper-graphite specimens showed small wear, low noise levels and uniform friction constants. 16 ref. (Q9p, H15; Cu, 6-72)

640-Q.* (German.) **Mechanical Properties of Lead Alloys.** Erich Pelzel. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 102-110.

Mechanical properties of Pb-Sb alloys, such as tensile strength, ultimate strain, hardness and the influence of alloying elements such as Sn, Sn-As, Cu, Ni, Bi, Cd, Li and Te. Age hardening effects of the various components. 9 ref.
(Q-general, 2-60, N7a; Pb, *Sb*)

641-Q. (Japanese.) **Severe Wear of Pearlitic Steel Weld Metal.** Sukemitu Ito, Kozo Honda and Kikuzo Ishiyama. *Journal of Mechanical Laboratory,* v. 12, Mar. 1958, p. 52-59.

Relationship between wear and microstructure; microscopic examination of wearing surfaces. 8 ref. (Q9n, M27; ST, 7-51)

642-Q.* (Portuguese.) **Study on Radial Compression Strength of Porous Bronze Gaskets.** Vincente Mazzarella. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 63-93.

Correlation of limit of resistance to radial compression of gaskets with particle size of Cu, molding pressure, sintering temperature and Sn content. 13 ref. (Q28g, H-general; Cu)

643-Q. (Russian.) **Heat Resistance of Austenitic Steels During Cyclic Temperature Changes.** *Metallovedenie i Obrabotka Metallov,* Feb. 1958, p. 38-49.

Study of various factors, particularly effect of alternating temperatures, on failure of gas turbine blades. Creep rate of austenitic steel blades at 982° is 7 times as great under alternating as compared to stable temperatures. 15 ref. (Q-general, Q3, T7h, 2-61; AY)

644-Q. (Russian.) **Effect of Internal Stresses on Inclusion Formation.** I. E. Brainin, V. A. Kharchenko and A. I. Kondrashov. *Stal',* v. 18, Apr. 1958, p. 342-348.

Effect of internal stresses in steel forgings on inclusion formation, caused by joint action of hydrogen and tensile stresses—mechanical, thermal and structural. 13 ref. (Q25, F22, 9-69; ST, *H*)

645-Q. (Russian.) **Method of Testing Nontwisting Wire Cables.** M. F. Glushko. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 211-213.

(Q27, 1-54, T7g)

646-Q. (Russian.) **Determination of Cohesive Strength and Fatigue Limit of Thin Electrolytic Antifriction Coatings.** G. G. Gugunishvili. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 333-335.

(Q10c, Q7a; 8-12)

647-Q. (Pamphlet.) **Large Fatigue Testing Machines and Their Results.** *American Society for Testing Materials, Special Technical Publication* no. 216, 1958, 162 p., $4.25.

Symposium presented at Atlantic City in June 1957. Papers on fretting corrosion of large shafts, fatigue tests of large alloy steel shafts, sudden fracture of machine parts and determination of dynamical loading in fatigue tests. (Q7, 1-53)

648-Q. **Creep Properties of Austenitic Nickel:Chromium Steels Containing Niobium.** W. H. Bailey, M. G. Gemmill, H. W. Kirby, J. D. Murray, E. A. Jenkinson and A. I. Smith. *American Society of Mechanical Engineers,* Paper no. 52-A-254, Dec. 1957, 9 p.

(Q3; SS)

649-Q. **Creep, Stress-Relaxation, and Metallurgical Properties of Steels for Steam Power Plant Operating With Steam Temperatures Above 950° F. (510° C.).** A. I. Smith, E. A. Jenkinson, D. J. Armstrong and M. F. Day. *American Society of Mechanical Engineers,* Paper no. 57-A-255, Dec. 1957, 24 p.

10 ref.

(Q3, Q-general, W11h; SS, 4-60)

650-Q.* **Metallurgical Factors in the Design of Hydraulic Equipment for Elevated Temperature Application.** A. Mars and N. M. Lazar. *American Society of Mechanical Engineers,* Paper no. 58-AV-11, 1958, 8 p.

Short - time high - temperature strength, creep - rupture, creep strength, fatigue strength, stress relaxation, thermal stress fatigue, thermal expansion and wear resistance discussed for toolsteels, cast iron, titanium, aluminum and magnesium alloys. 12 ref. (Q-general, 2-62; TS, CI, Ti-b, Al-b, Mg-b)

651-Q. **The Case Against the Tension Test.** *Australasian Manufacturer,* v. 43, Apr. 19, 1958, p. 52-57, 80-83.

Foundryman's case for the overevaluation of wrought metals by the elongation and reduction of area features of the tension test. (Q27)

652-Q. **The Mechanical Wear of Metals.** W. Hirst. *British Journal of Applied Physics,* v. 9, Apr. 1958, p. 125-132.

Main phenomena, the laws and the mechanisms of wear in unlubricated conditions, and the present state of development of theories of wear. 28 ref. (Q9)

653-Q. **Deformation of Solids at High Rates of Strain.** A. H. Cottrell. *Chartered Mechanical Engineer,* v. 4, Nov. 1957, p. 448-460.

44 ref. (Q24)

654-Q.* **Carbon-Manganese Steel.** J. Glen. *Iron and Steel,* v. 31, May 1958, p. 165-171.

Proof stress tests carried out at temperatures up to 450° C. on car-

bon-manganese steel in as-rolled condition, in normalized condition or after tempering for 2 hr. at 650° C. Steels were basic open-hearth, silicon killed or aluminum killed. Effect of Mn on proof stress values; relationship between proof stress at high-temperature and room temperature tensile strength; effect of silicon killing, yield phenomena, normalizing, microstructure on proof stress. (Q23b, Q27a, T26q, 2-60, 2-61, 2-64; ST-c, ST-e, 4-53)

655-Q.* Effect of Phosphorus on the Tensile and Notch-Impact Properties of High-Purity Iron and Iron-Carbon Alloys. B. E. Hopkins and H. R. Tipler. *Iron and Steel,* v. 31, May 21, 1958, p. 263-274.

Two important effects of adding phosphorus to iron are the much greater strengthening than obtained by comparable amounts of metallic alloying elements, and the progressive development of grain-boundary weakness which can be modified by heat treatment. For phosphorus contents above 0.05%, the transition temperatures in the Charpy impact test were high as a result of the enhanced yield stress and the reduction in brittle fracture stress arising from the weakening of the grain boundries.

(Q27a, Q6n, 2-60; CI, Fe-a, *P*)

656-Q. Creep of Pre-Strained Aluminum. *Metal Industry,* v. 92, May 23, 1958, p. 432, 434.

(Q3; Al)

657-Q. Work-Hardening and the Initiation and Spread of Fatigue Cracks. N. F. Mott. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 145-147.

(Q7, Q23a, 9-72)

658-Q. The Mechanism of Work-Hardening and Slip-Band Formation. J. Friedel. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 147-159.

36 ref. (Q24c, Q23a, Q7)

659-Q. The Energy Stored in Fatigue of Metals. L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 160-166.

7 ref. (Q7)

660-Q. Hardening and Softening of Metals by Cyclic Stressing. T. Broom and R. K. Ham. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 168-179.

New investigations of the hardening produced in annealed polycrystalline Cu and Al by alternating stresses applied at a frequency of 100 cycles per sec. and of such magnitude as to give complete fatigue failures in 2×10 cycles. 29 ref. (Q7, Q29)

661-Q. The Initial Fatigue Crack. G. C. Smith. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 189-197.

Formation of persistent slip bands during cyclic stressing and their development into fatigue cracks. In Cu and Al at low temperatures fatigue cracks appear to be formed in this way; at room temperature in Al they may form also along grain boundaries. 4 ref. (Q7; Cu, Al)

662-Q. Slip-Band Damage and Extrusion. P. J. E. Forsyth. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 198-202.

Slip-band extrusion was first observed in a fatigued 4% Cu aluminum alloy, but has now been found to occur in many other materials. It takes the form of a thin ribbon or scroll of the crystal material projecting as much as 20μ from the slip band. The thickness of the ribbon varies with different materials and fatigue conditions, that observed on the above alloy being less than 0.1μ. 6 ref. (Q24a)

663-Q. Extrusion and Intrusion by Cyclic Slip in Copper. A. H. Cottrell and D. Hull. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 211-213.

Extrusions and intrusions observed on slip bands in Cu fatigued at 300.90 and 20° K. A model based on a sequence of slip movements during a fatigue cycle is proposed to explain their formation. 4 ref. (Q24c; Cu)

664-Q. Some Observations on the Spread of Fatigue Cracks. N. E. Frost and C. E. Phillips. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 216-222.

Fatigue cracks after the stage of initiation; conditions under which continuous propagation does not occur. 13 ref. (Q7, Q26q)

665-Q. Speed Effect in Fatigue. P. G. Forrest. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 223-227.

It is usually found that the fatigue strength of metals is slightly reduced by decreasing the cyclic

speed, the reduction becoming greater with increase in temperatures between 200 and 300° C. In this range the fatigue strength is considerably greater at 10 cycles per min. than at 2000 cycles. It is thought that this behavior is caused by strain aging. 8 ref. (Q7, N7e)

666-Q* Plastic Deformation of Nickel Single Crystals at Low Temperatures. Peter Haasen. *University of Chicago, Institute for the Study of Metals, 48th Quarterly Report,* Pt. 1, Mar. 1958, 39 p.

Single crystals of Ni (purities of 99.98% and 99.4%) were deformed in tension at various temperatures between 4.2° K and 300° K. Shear stress-shear strain relations determined as well as reversible change of flow stress with temperature. Work hardening parameters discussed in terms of dislocation theory that has been developed mainly on the basis of data on Al and Cu. 42 ref. (Q23a, Q2, 2-63; Ni, 14-61)

667-Q.* Charpy Brittle-Fracture Transitions by the Lateral Expansion Energy Relationship. George M. Orner. *Welding Journal,* v. 37, May 1958, p. 201s-205s.

Brittle fracture transition temperature corresponding to a discontinuity in fracture versus lateral expansion relation correlates with low-low transition temperature provided effect of adiabatic temperature rise is taken into consideration.
(Q6, Q23r, Q26s, 2-61; AY)

668-Q.* A Unique Machine for Large Scale Fatigue Testing. H. V. Cordiano. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 3-20.

Machine of vibratory type; disturbing force consists of an alternating couple developed by two sets of rotating eccentric disks on parallel shafts rotating in the same direction 180° out of phase. Absorber consists of weighted test specimen subjected to bending load. Results of fatigue tests on riveted and welded steel plate. 10 ref.
(Q7e, 1-53; ST, 4-53, 7-51, 7-53)

669-Q.* Torsional Fatigue Testing of Axle Shafts. E. J. Eckert. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 21-36.

Construction and operation of hydraulic nonresonant constant-load machine for performing unidirectional torsional fatigue tests on axle shafts up to 4 in. in diameter. Effects of inclusions, straightening, shock peening and hardness profile on fatigue strength of SAE 86B45H and 4150 steels. (Q7h, 1-53, T7j; AY)

670-Q.* Fatigue Testing of Airframe Structural Components. H. W. Foster. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 37-58.

Points to be considered in laying out simulated service fatigue tests of components. Tests of primary wing service structure, landing gear, secondary and equipment structure subjected to high-cycle loading. Reliability of data obtained from tests of single components. 9 ref. (Q7, 1-54, T24a)

671-Q.* Fatigue Performance of Marine Shafting Laboratory and Service Tests. T. W. Bunyan. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 59-80.

Arrangement and operation of fatigue machine designed to test steel shafts 5½ to 10 in. in diameter under repeated reversed torsional loading. Results of tests on shafts of acid openhearth carbon steel. Effects of notches or pellets on torsional fatigue strength. Service failure of tail shafts. 4 ref.
(Q7h, 1-53, T7j; ST-e, 1-64)

672-Q.* Fretting Corrosion of Large Shafts as Influenced by Surface Treatments. Oscar J. Horger and H. R. Neifer. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 81-95.

Rotating bending fatigue tests on 79/16-in. diameter normalized and tempered 0.5% plain carbon steel shaft forgings having a press-fitted outer disk member. Disk seat of some assemblies was Cr plated; others phosphate coated. Fatigue resistance improved by Cr plating, but little by phosphate coating. Information on surface rolling of 27-in. propeller shafts. 11 ref.
(Q7c, R1f, T7j; CN)

673-Q. Fatigue Tests of Large Alloy Steel Shafts. F. C. Eaton. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 96-106.

Fatigue tests on 9-in. diameter unnotched and 8½ in. diameter

notched shafts of alloy steels with about 0.2% C, 2.8% Ni, 0.3% Cr, 0.35% Mo, and 0.06% V. Tests were made in rotating-beam type machine in which load is applied to shaft by misalignment of the bearings. Comparison to results obtained with small-diameter specimens of similar compositions. 4 ref.

(Q7c, T7j; AY)

674-Q. Influence of Operating Experience and Full Scale Tests on Propulsion Shafting. Design of U. S. Navy Ships. Rudolph Michel. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 107-131.

Causes and characteristics of failures in shafting. Evaluation of static and dynamic forces acting on shafting; use of fillets for reducing stress concentration; protection against corrosion; design of shafting. 16 ref. (Q7, T7j; 17-51)

675-Q.* Sudden Fracture of Machine Parts and Structure Elements. G. V. Uzhik, M. J. Galperin and A. A. Zooykova. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 132-141.

Static loading resulted in brittle fracture even when zone of fatigue failure comprised only 0.12 of cross section. Brittle fracture also occurred in plates with notches of small radius under static loading. Notched plates of carbon steel of various thicknesses were tested in tension and under static bending to determine thickness at which transition from two-dimensional to three-dimensional stress state and transition of ductile to brittle failure occurred. (Q7, Q26s; CN, 4-53)

676-Q.* Determination of Dynamic Loading in Full Size Fatigue Tests and Some Results. S. V. Serensen and M. E. Garf. Paper from "Symposium on Large Fatigue Testing Machines and Their Results," ASTM, STP no. 216, 1958, p. 142-151.

Classification of fatigue machines according to their dynamic performance. Dynamic arrangements of bending machine and results of fatigue tests on cast iron and carbon steel crankshafts and large specimens subjected to constant and varied bending moment amplitudes. 9 ref. (Q7g, 1-53; T7j; CI, CN)

677-Q. (English.) **Influence of Surface Roughness on the Mechanism of Contact Between Metal Surfaces.** Tadasu Tsukizoe and Susumu Kikuchi. *Osaka University, Institute of Polytechnica, Journal,* v. 3, Mar. 1958, p. 1-6.

5 ref. (Q9p, S15)

678-Q. (English.) **Mechanical Properties Caused by Low-Temperature Annealing of Cold Worked Pure Iron.** Jiro Saga and Toichi Watanabe. *Osaka University, Institute of Polytechnica, Journal,* v. 3, Mar. 1958, p. 35-44.

10 ref. (Q-general, J23; Fe-a)

679-Q. Some Correlations Regarding the Mechanical Strength of Materials Obtained by Sintering of Powdered Metals. Pt. 3. Case When Powder Mixtures Contain Easily Fusible Components. B. Ia. Pines, A. F. Sirenko and N. I. Sukhinin. *Soviet Physics, Technical Physics,* v. 2, 1958, p. 1773-1779. (American Institute of Physics, Inc.)

The mechanical strength of single-phase pressings of the powder of a plastic metal (Cu) heated at a high temperature (1000° C.) decreases with increase of porosity over a wide range (0.40%), which is to be expected, considering the weakening of the cross section. At the same time the strength depends only on the final porosity (obtained after heating) and is independent of the initial porosity (dependent on compression). For a given final porosity a slight dependence of strength on the granular condition of the powder is observed. 4 ref.

(Q27a, H11n; Cu)

680-Q.* (German.) **Influence of Cold Forming on the Damping of Iron-Chromium Alloys.** Karl Bunhardt and Hans Preisendanz. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 241-247.

Effect of cold forming on damping maximum at 220 and 600° C. in case of pure Fe, pure Cr and Fe-Cr alloys with 6-45% Cr. Relationship between damping, grain size and recrystallization temperature. Alteration of grain-boundary toughness caused by nitrogen absorption.

(Q8; Fe, Cr)

681-Q. (German.) **Evaluation of Stresses in Gear Teeth on the Basis of Optical Measurements.** H. Glaubitz. *Werkstattstechnik und Maschinenbau,* v. 58, Apr. 1958, p. 216-222.

Study of stresses in gear teeth by taking isochromatic pictures. Experimental conditions. Preparation

of specimens. Estimation of stresses by comparison of measured and calculated stresses. (Q25, T7a, 1-53)

682-Q.* (German.) **Effect of Hydrogen on Fatigue Behavior of Titanium.** Kurt Claus. *Zeitschrift für Metallkunde,* v. 49, Apr. 1958, p. 201-205.

Effect of hydrogen on tearing strength of notched and smooth specimens. Effect on fatigue strength and creep resistance. Accelerated hydride precipitation caused by tension stress.

(Q7, 2-60, Q3; Ti)

683-Q.* (Russian.) **Metallurgical Study of the Influence of Predeformation at Different Temperatures on the Plastic Deformation of Aluminum Single Crystals.** L. I. Vasil'ev, Ch'ien Lin-chao and Yang Ta-yu. *Scientia Sinica,* v. 8, no. 1, 1958.

Metallographic and electron microscope study of the influence of preliminary stretching upon the relief of single crystals of pure Al and their subsequent elongation under different conditions of temperature. Preliminary elongation at low temperature causes a number of peculiarities of the structure to appear in subsequent elongation at high temperature. The influence of high-temperature predeformation in subsequent low-temperature tests appears chiefly in the superposition of a superficial deformation relief.

(Q24, M26c; Al, 14-61)

684-Q.* **New Alloy Steels Beat Process Bugaboos.** R. B. Norden. *Chemical Engineering,* May 19, 1958, p. 180-184.

Four very-low-carbon grades of wrought stainless steel are commercially available today: an 18-8 Cr-Ni steel (304L); 18-8 with about 2.58% Mo (316L); 18-8 with about 3.5% Mo (317L); and a high-Mn, low-Ni grade (204L). Specific purpose in development was to provide an austenitic stainless steel of superior resistance to intergranular corrosion. (Q-general, R2h; SS)

685-Q.* **Surface Structure of Slip Bands on Copper Fatigued at 293°, 90°, 20°, and 4.2° K.** D. Hull. *Institute of Metals, Journal,* v. 86, May 1958, p. 425-430.

Slip bands produced during fatigue deformation of high-purity Cu at temperatures between 293 and 4.2° K. studied with optical and electron microscopes. Replicas of the surface reveal the changes in contour within individual slip bands, above and below the surface. Extrusions and intrusions are formed in the slip bands at all temperatures of testing, and their formation is not suppressed at 4.2° K. 17 ref. (Q24a, Q7; Cu-a)

686-Q.* **Some Effects of Mechanical Working on the Deformation of Nonmetallic Inclusions.** F. B. Pickering. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 148-159.

Effect of temperature and extent of hot working upon deformation characteristics. At high temperatures siliceous inclusions deform and elongate prior to fracturing, but at lower temperatures they fracture with little or no deformation. Concluded that fracture of the inclusions is necessary to disperse the larger detrimental inclusions into smaller, less harmful particles. 5 ref. (Q24; ST, 9-69)

687-Q.* **Uncommon Metals Ready to Solve Difficult Problems.** J. P. Denny and L. F. Kendall. Digest of paper presented before Design Engineering Conference, Chicago, Apr. 1958. *Metal Progress,* v. 73, June 1958, p. 136, 138, 140, 142, 144, 146, 148.

Zirconium, hafnium, vanadium, columbium, tantalum, chromium and rhenium, now available at least in development quantities, are finding applications formerly unknown. Properties and prices. (Q-general, P-general; SGA-g, SGA-h, Cr, Cb, Ta, V, Zr, Hf)

688-Q. Regularities in Creep and Hot-Fatigue Data. Pt. 2. K. F. A. Walles and A. Graham. *National Gas Turbine Establishment,* Report no. R.190, Dec. 1956, 144 p.

Creep-rupture, creep rate and hot fatigue data for 44 materials considered theoretically.
(Q3, Q7, 2-62)

689-Q.* **The Mechanical and Engineering Properties of Commercially Available Titanium Alloys.** H. V. Kinsey. *North Atlantic Treaty Organization Advisory Group for Aeronautical Research and Development,* Report 100, 1957, 15 p.

Lists the Ti alloys produced on a commercial basis up to early 1957; nominal chemical compositions and manufacturer's designations; physical, mechanical and engineering properties. Those properties required by the aeronautical design engineer that are not available.
(Q-general; Ti-b)

690-Q.* Statistical Aspect in Accelerating Creep and Creep Fracture of OFHC Copper. Takeo Yokobori. *Physical Society of Japan, Journal,* v. 13, Mar. 1958, p. 305-312.

A large number of creep-rupture tests on OFHC Cu wire have been carried out at stress levels of 24.0 to 25.0 kg. per sq. mm. and temperatures of 8 to 40° C. The F-test was made for the differences in variance between time for initiation of accelerating creep and time for rupture measured from the initiation of accelerating creep, and the regression analysis between these times was carried out. 10 ref. (Q3, S12; Cu-a)

691-Q.* Annealed Metals Under Alternating Plastic Strain. W. A. Wood and R. L. Segall. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 180-188.

Annealed Cu, Ni, Al and alpha brass were subjected to cycles of small alternating torsion in which the amplitude of plastic strain was held constant; proof stresses required to impose the successive reversals of strain were measured. Variations in this proof stress, which shows how the metal strain-hardens at each amplitude, are correlated with structural changes shown by X-ray diffraction and metallographic examination. 19 ref. (Q7, Q1; Cu, Al, Ni)

692-Q. Fatigue and Ultimate Tensile Strengths of Metals Between 4.2 and 293° K. R. D. McCammon and H. M. Rosenberg. *Royal Society, Proceedings,* v. 242, Oct. 29, 1957, p. 203-211.

Fatigue of Cu, Ag, Au, Al, Mg, Zn and Fe has been investigated at 4.2, 20, 90 and 293° K. Except for Zn and Fe, which exhibit brittle fracture at low temperatures, fatigue characteristics improve considerably as the temperature is reduced. Ultimate tensile strength was measured at each temperature and showed a marked correlation to the increase in fatigue strength at low temperatures. Results with reference to current ideas on the mechanism of fatigue. 10 ref. (Q7, Q27a, 2-63; Ag, Al, Au, Cu, Fe, Mg, Zn)

693-Q.* On the Ductility of Polycrystalline Beryllium. J. F. W. Bishop. *United Kingdom Atomic Energy Authority,* IGR-Tn/S-791, Feb. 1958, 12 p.

The elongation to failure of single and polycrystalline specimens of Be is markedly correlated with crystal and grain orientations, varying from virtually zero to tens of percent. Anomalous ductility of the metal under time independent straining conditions can be rationalized on the basis of the great resistance to compressive deformation normal to the basal plane offered by the crystals at temperatures below 700° C. Directional ductility can in principle be induced in the metal to meet specific requirements. 6 ref. (Q23p; Be)

694-Q. Room Temperature Deformation Process in Zirconium. E. J. Rapperport. Nuclear Metals, Inc. *U. S. Atomic Energy Commission,* NMI-1199, Feb. 24, 1958, 24 p. (Order from Office of Technical Services, Washington 25, D. C.) $.75.

Work performed on single crystals and on large-grained samples of relatively high purity. Iodide crystal-bar Zr was used, some samples being made from arc-melted stock, and some from the crystal bar as grown. Two methods of crystal production were employed. One was to maintain the samples at 840° C. in vacuo for eight to ten days; the other was to cycle the samples two or three times between 1200 and 840° C., remaining at the higher temperature for about 4 hr., and at the lower for five days. The only slip system observed was (1010) [1210] with a critical resolved shear stress for slip of about 0.65 kg. per sq. mm. in compression. The active twin planes were {1012}, {1121}, {1122}, and {1123}. 18 ref. (Q24; Zr, 14-61)

695-Q. Plastic Strain Absorption as a Criterion for High Temperature Design. C. R. Kennedy and D. A. Douglas. Oak Ridge National Laboratory. *U. S. Atomic Energy Commission,* ORNL-2360, May, 1958, 25 p. (Order from Office of Technical Services, Washington 25, D. C.) $1.

Test apparatus is capable of mechanically cycling a specimen in tension and compression within set strain limits. Data confirm Coffin's theory that total plastic strain per cycle can be used to predict the number of cycles to failure. Evidence that Inconel strain weakens at the test temperature; grain size found to be the most important variable affecting the behavior of materials subjected to strain reversals. (Q23, 1-53, 2-59; Ni-b)

696-Q.* Fatigue and Ultrasonic Attenuation. Rohn Truell and Akira Hikata. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 63-70.

Attenuation as a function of the number of cycles in tension or in tension and compression. Results of these measurements in 2S, 24ST-4 and 75S Al. (Q7, 1-74)

697-Q.* Studies of Type 301 Stainless Steel Columns. Julien Dubuc, V. N. Krivobok and Georges Welter. Paper from "Metals", ASTM STP No. 196, p. 1-21.

Creep or cycling the applied load has no effect on the final stress-strain compression curve; however, the stress-strain relationship in the column after previous stressing and then relieving the stress to zero is entirely different from the original relationship. Beneficial effects of heat treatment at relatively low temperatures. 4 ref. (Q28k, 2-64; SS)

698-Q.* Effect of Forming on Mechanical Properties. J. L. Waisman and C. S. Yen. Paper from "Metals", ASTM STP No. 196, p. 33-44. (Also appears in "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 67-78.)

Effects of stretching and bending on the static and fatigue strengths of sheet metals were determined experimentally on several aluminum alloys, commercial pure titanium and Type 302 stainless steel. These effects can be explained or predicted by considering the effect of three factors; strain hardening, micro-residual stress, and macro-residual stress.

(Q7a, Q27a, 3-68; Al, Ti, SS, 4-53)

699-Q.* Axial Stress Fatigue, Creep, and Rupture Properties of Unnotched and Notched Specimens of Heat-Resistant Alloys. F. H. Vitrovec and B. J. Lazan. Paper from "Metals", ASTM STP No. 196, p. 45-62.

Fatigue, rupture and creep data at various temperatures obtained under various combinations of mean and alternating stress for Stellite 31, Waspalloy (6.3% Mo), Inconel X-550, Timken 16-25-6, Lapelloy, and stainless steel Type 403. Data are presented as stress range diagrams to show effect on the fatigue and creep properties of specimen notch, temperature, ratio of alternating-to-mean stress, and stress magnitude. 11 ref.

(Q7, Q3m; SGA-h, SS, Co, Ni)

700-Q.* Determination of Young's Modulus Under Conditions of Relaxation. Raymond W. Fenn. Paper from "Metals", ASTM STP No. 196, p. 63-76.

Equipment for determination of Young's modulus in Mg alloys; methods for obtaining improved axial alignment. Statistical analyses show effect of five methods of gripping specimens on the apparent Young's modulus and the degree of misalignment. 4 ref. (Q21a, 1-53; Mg)

701-Q.* Effect of a Number of Variables on the Fatigue Properties of High-Strength Steels. G. Sachs, B. B. Muvdi and E. P. Klier. Paper from "Metals", ASTM STP No. 196, p. 77-93.

Fatigue tests were performed on specimens machined from 3 to 4½-in. round or square steel sections subsequently heat treated. Steels were aircraft quality 4340, 93B40, V-Mod. 4330, Hy-Tuf and Super Hy-Tuf. Variables studied were specimen position in the steel section, as-processed section size, strength level or tempering temperature, stress concentration, and fibering or directionality. 10 ref. (Q7; AY, SGB-a)

702-Q.* The Effect of Temperature, Frequency, and Grain Size on the Fatigue Properties of High-Purity Aluminum. N. H. G. Daniels and John E. Dorn. Paper from "Metals", ASTM STP No. 196, p. 94-110.

At room temperature the fatigue strength of high-purity Al approaches a lower limiting value in accord with the usual observations on nonferrous metals. At 250° C. fatigue strength continues to decrease abruptly with increasing cycles of stress without exhibiting any trend toward reaching a limiting value even at 10^7 cycles; finer grain-sized specimens exhibit higher fatigue strength at 250° C. 16 ref. (Q7a, 2-61, 2-59; Al-a)

703-Q.* Determination of Fatigue-Crack Initiation and Propagation in a Magnesium Alloy. R. B. Clapper and J. A. Watz. Paper from "Metals", ASTM STP No. 196, p. 111-122.

Rotating-beam fatigue tests were carried out on AZ63A-T4 Mg alloy to determine the initiation and propagation characteristics of a fatigue crack. An electric resistance method for measuring cracks nondestructively was developed. No relationship was apparent between life before crack initiation and life after initiation. 10 ref. (Q7, Q26; Mg)

704-Q.* Uni-Directional Axial Tension Tests of Beryllium Copper and Several Precipitation Hardening Corrosion-Resistant Steels. M. H. Weisman, J. Melill and T. Matsuda. Paper from "Metals", ASTM STP No. 196, p. 123-142. (Also appears in "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 47-66.

Results of notched tensile tests and smooth and V-notched fatigue tests are reported for beryllium copper, AM350 corrosion-resistant steel, and A-286 heat and corrosion resistant steel, and for open-hole notched specimens of 17-7PH corrosion-resistant steel. Cyclic loading tests also are reported for dimpled and riveted sheet specimens of AM350 steel which simulate typical single-lap riveted aircraft joints. Other tests are reported for 17-7PH steel specimens containing unloaded rivet-filled holes. (Q7; Cu, *Be,* SS)

705-Q.* The Properties of Beryllium Copper Strip as Affected by Cold Rolling and Heat Treatment. John T. Richards and Ellsworth M. Smith. Paper from "Metals", ASTM STP No. 196, p. 143-156.

Tension and hardness tests to determine the influence of cold rolling and precipitation hardening; also effect of Be content, strip thickness and structure. New age-hardening treatments for maximum strength and hardness are proposed. 11 ref.

(Q27a, Q29n, 2-64, 3-68, J27; Cu-b, *Be*)

706-Q. Full Scale Wing Fatigue Testing. A. R. Vollmecke. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 1-9.

Tests currently being run at Convair. (Q7k, T24a)

707-Q.* Riveted-Joints Fatigue Strength. C. R. Smith and G. D. Lindeneau. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 10-28.

Fatigue strength of riveted joints is affected by following variables: residual stress due to riveting; stress due to load per rivet; bending stress caused by eccentric loading; stress due to load passing onto other rivets. (Q7; 7-53)

708-Q.* The Rehabilitation of Fatigue-Weary Structure. J. P. Butler. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 29-46.

Initial fatigue cracks in Al aircraft structures are of local nature in typical structural joints studied. Fatigue cracks at fasteners were reliably discovered by visual inspection with only small-power magnification. Careful inspection practices, the removal of 0.030 in. of material in the hole beyond the last visual traces of the fatigue crack effectively removes fatigue damaged material and provides an extended service life for the joints. 9 ref. (Q7, T24a; Al)

709-Q.* Fatigue Testing of Airframe Structural Components. H. W. Foster. Paper from "Fatigue of Aircraft Structures", ASTM STP No. 203, p. 79-100.

Typical airframe component tests illustrated and discussed, including tests of primary wing surface structure, landing gear, and secondary and equipment structure subjected to very high cycle loadings. 9 ref.

(Q7, T24a, 1-54)

710-Q. Summary of Strength Limitation Phenomena. George Sachs. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 11-35.

Effect of carbon content, hydrogen and oxygen on tensile strength, yield strength and ductility of constructional steel. 13 ref.

(Q27a, Q23p, Q23b, 2-60; ST, SGB-s)

711-Q. Dislocations and Strength. P. B. Hirsch. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 36-70.

Current theories on plastic deformation. Yield stress of a metal is determined by two factors; the elastic interactions between the dislocations which must be overcome before the dislocations move, and the "frictional force" on the dislocations on account of the presence of jogs, or because of the difficulty of cutting through other dislocations. 19 ref. (Q24, M26b)

712-Q. Effects of Grain Size, Solid Solution and Other Metallurgical Factors on Strength. Earl R. Parker. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 71-83.

To harden a metal it is necessary to introduce many barriers which are either impermeable to dislocations or through which dislocations can pass only at high stress levels. There are several very effective barriers, namely grain boundaries, clusters of solute atoms, precipitated particles and piles of tangled dislocations. Effect of each of these. 8 ref.

(Q27a, Q29n, M26b, N-general)

713-Q. Dependence of Strength on Loading Speed and Loading Time. D. S. Wood. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 103-124.

The effect of rate and time of loading on the conventional stress-strain characteristics; influence of wave propagation phenomena. 7 ref. (Q25n)

714-Q. Strength Limitations Under Repeated Load. Elio D'Appolonia. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 125-142.

Tests on rotating-beam specimens of 75A Ti alloy at high stress levels show a pseudo-elastic behavior for a portion of their fatigue life. Stress-strain relation during cyclic loading is the same as the linear portion of the stress-strain curve obtained by static loading. Continuous time records of the mid-span deflection and the torque necessary to turn a rotating-beam fatigue specimen at constant speed were used to study damage produced by plastic deformations. 8 ref. (Q7, Q25n; Ti)

715-Q. Effect of Section Size on Fracturing. J. D. Lubahan. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 143-161.

Size effect in mild steel has to do with the mode of crack propagation. In larger specimens, sudden cleavage fracture sets in after a smaller amount of gradual tearing than in smaller specimens. There is a size effect on strength and ductility, in addition to the effect on mode of crack propagation, in certain heat treated steels and high-strength Al alloys. The size effect is more pronounced for sharper notches or for harder metal. 11 ref. (Q26, 3-73; CN)

716-Q. Effects of Stress Concentrations and Residual Stresses. Oscar Hoffman. Paper from "Proceedings of the Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 162-178.

Problems that arise in connection with the employment of large forgings of high-strength alloys in aircraft structures and specifically in aircraft landing gears. Behavior of a structural alloy in an area of stress concentration depends upon its ductility (i.e., on the amount of plastic flow that can develop before fracture and modify the stress distribution in the sense of reducing stress peaks). (Q25; SGB-a)

717-Q. Effects of Hydrogen on High-Strength Alloys. Volker Weiss. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 179-203.

General effects of hydrogen in steels and Ti alloys originating from both cell action and processing in hydrogen-containing environments. Effects of strain rate on hydrogen embrittlement were studied on 4340 steel. The notch-tensile test, which was earlier proven to be highly ductility-sensitive, was used. Similar effects were observed on Cu-plated low-alloy steels having strength levels below 200,000 psi. and on Ti. 9 ref.

(Q27, Q26s; AY, SGB-a, *H*)

718-Q. Super-High Strength Steels for Aircraft Applications. I. W. Sands. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 204-232.

Four steels of the ultra high-strength type used in current production airplanes: standard 4340, modified 4330 (Bendix-Republic AMS 6427) Hy-Tuf, another modification of the 4330 type originally designated TM-2 but now rechristened HS-220 (Timken). 7 ref.

(Q27a, T24a, 17-57; AY, SGB-a)

719-Q. High Impact Strength Steels for Low-Temperature Service. A. Hur-

lich. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 233-257.

Requirements of steels for ordnance application. Boron-treated alloy steels and use of rare earth additions to steel to improve ductility and low-temperature toughness at high strength levels.

(Q6n, Q23p, 2-63, T2, 17-67; AY)

720-Q. Strength Limitations of High Strength Steels at Moderately Elevated Temperatures. W. F. Brown. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 258-288.

Creep and high-temperature behavior of SAE 4340 (A), SAE 4340 (B), 17-22 A (S), AMS 5616, 17-4 PH, AISI 410, Inconel X, and A286. Optimum heat treatments. 23 ref. (Q3, 2-62, J-general; AY, SS, Ni-b)

721-Q. Onset of Fast Crack Propagation in High Strength Steel and Aluminum Alloys. G. R. Irwin. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 289-305.

Various amounts of fracture extension force may be applied to a test specimen containing a crack and the response measured in terms of time rate of fracture extension. It is generally true that this extension rate changes from slow to fast for relatively small changes of the crack extension force. Therefore the critical values, thus determined, have a significance relative to resistance to fracturing similar to that of yield strength as a measure of resistance to yielding. 5 ref. (Q26q; ST, Al, SGB-a)

722-Q. Strength Limitations for Titanium Alloys. S. V. Arnold. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 306-352.

Relation of strength-to-ductility and of strength-to-toughness. Of the binary systems, Ti-Mn, Ti-Mo and Ti-V show the most promise; of the ternary systems, Ti-Al-Mn, Ti-Al-V, Ti-Mn-V and Ti-Mo-V show superiority. Alloys containing interstitial elements are inferior.

(Q27a, Q23; Ti-b)

723-Q. Aluminum Alloys. E. H. Dix. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 353-379.

Four classifications of Al alloys discussed: high-strength wrought alloys; some new permanent mold casting alloys having improved combinations of strength and ductility; alloys and products for elevated-temperature service; wrought non-heat-treatable alloys for welded structures. (Q27; Al)

724-Q. High Strength Magnesium Alloys. J. C. McDonald. Paper from "Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals", U. S. Office of Technical Services, PB 131280 and PB 131281, p. 380-398.

Factors involved in alloy development; principles of strengthening in Mg alloys; classes of alloys; extrusion and forging alloys; sheet alloys; casting alloys; alloys with maximum properties at elevated temperatures; design considerations. (Q27; Mg, SGB-a)

725-Q. On the Change of Electrical Resistivity in Elementary Dislocation Generation. E. D. Shchukin, V. N. Rozhanskii and Iu. V. Goriunov. *Soviet Physics "Doklady"*, v. 2, 1957, p. 420-422. (Translation by American Institute of Physics Inc.)

Experiments performed on single crystals of Cd (0.75 mm. diameter) and of Zn (0.5 mm. diameters), 15-20 mm. long, at room temperature with the initial angle 30° between the hexagonal axis and the direction of stretching. Stretching occurred under a constant load to 3-5% elongation at an average rate of (0.03-0.6) 10^{-4} cm. per sec.; 1% stretching was ordinarily observed at intervals of 1 to 2 hr.

(Q24, P15g; Cd, Zn, 14-61)

726-Q.* (Japanese.) **Effect of Manganese and Chromium on the Characteristics of Aluminum-Magnesium (3-5%) Alloys. Pt. 3.** Rihei Kawachi. *Light Metals (Tokyo)*, v. 8, Mar. 1958, p. 24-33.

Effect of Mn, Cr, Fe, Si, Cu, Zn and Ti on tensile properties and corrosion resistivity of sample (0.5 mm. thick) immersed in sea water with or without stress for up to 12 months shows Mn, Cr, Fe or Cu decrease sensitivity. Effect of Mg, Si, Cu, Zn or Ti on hot working temperature or the preheating characteristics of the ingot is not remarkable.

(Q27, R-general, 2-60; Al, *Mg*)

727-Q. (Russian.) **Relation Between Macro and Microhardness of Metals.** V. D. Lisitsyn. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 467-470.

Study of macro and microhardness of metals in original and deformed state with help of Vol'pert microtester. 10 ref. (Q29)

728-Q. (Russian.) **Application of Microhardness Test Methods to Determine Strength of Structural Steel After Riveting and Steels Hardened by Aging.** K. M. Pogodina-Alekseeva and E. E. Krotkova. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 470-473.

4 ref. (Q29q; ST, 2-64, 8-57)

729-Q. (Russian.) **Dynamic Method for Testing Modulus of Elasticity of Short Objects.** K. A. Bessonov and O. F. Stankevich. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 480-482.

4 ref. (Q21a, 1-54)

730-Q.* (Spanish.) **Brittleness in Heat Treated Type F. 123. I.H.A. Nickel-Chromium Steel.** Justo Ferrer Flotats. *Instituto del Hierro y del Acero,* v. 11, Jan-Mar. 1958, p. 39-57.

Extraordinary brittleness in series of camshafts led to a study of samples of same type of steel from other sources. Desired degree of toughness can be obtained through proper temperature control during tempering and control of cooling speed. 28 ref. (Q26s, 2-14; AY)

731-Q.* **Effect of Shot-Peening on Fatigue Strength.** R. P. Felgar. *American Society of Mechanical Engineers,* Paper no. 58-SA-46, 1958, 9 p.

Shot-peening introduces three effects: cold-working, residual stress, and stress concentrations. Relation of these effects to fatigue strength. Influence of the induced residual stress on the fatigue strength can be predicted theoretically. 19 ref. (Q7, G23n)

732-Q.* **Distribution of Fatigue Failures in Flat Hardened Steel Test Bars.** W. S. Hyler, L. P. Tarasov and R. J. Favor. *ASTM, Preprint no. 69,* 1958, 11 p.

Locations of fatigue nuclei in flat hardened steel bars tested in cantilever bending were analyzed with respect to their distributions in the three principal directions. Mean longitudinal fracture location was near the maximum stress section; the location was relatively insensitive to grinding or tumbling conditions, relative stress level (ratio of applied stress to fatigue limit), and whether failure nucleated at or below the surface. 8 ref.

(Q7, G18, L10d; ST)

733-Q.* **Torsional Fatigue Properties of Small Diameter High Carbon Steel Wire.** Harry C. Burnett. *ASTM, Preprint no. 70,* 1958, 11 p.

In general, there was no direct correlation between these properties and tensile strength of the wire. Comparison of a commercial cold drawn wire with wire from a vacuum-melted heat showed that the torsional fatigue life of cold drawn wire is decreased by the presence of inclusions. Oil tempered wire stressed in torsion is less susceptible to the initiation of longitudinal shear cracks than cold drawn music wire. Shot peening greatly increased the fatigue life of springs coiled from all three types of wire. 5 ref. (Q7h; CN-r, 4-61)

734-Q.* **Effects of Grinding Direction and of Abrasive Tumbling on the Fatigue Limit of Hardened Steel.** L. P. Tarasov, W. S. Hyler and H. R. Letner. *ASTM, Preprint no. 71,* 1958, 11 p.

Although it has generally been assumed that parts ground transversely to the direction of applied stress would have a lower fatigue limit than those ground parallel to it, no such effect was found for two different grinding conditions. Abrasive tumbling was found to raise the fatigue limit to a moderate extent, whether the surface had been previously stressed in tension or in compression by grinding. The tumbled surfaces were stressed very highly in compression and the failures nucleated below the surface. 5 ref. (Q7a, G18, L10d; ST)

735-Q.* **Evaluation of a Single-Shear Specimen for Sheet Material.** W. W. Breindel, C. L. Seale and R. L. Carlson. *ASTM, Preprint, no. 80,* 1958, 7 p.

Single shear-type specimen which provides values of ultimate shear strength evaluated by tests on annealed and cold rolled Type 304 stainless steel, 2024-T3 Al alloy, and annealed 6Al-4V Ti alloy. 5 ref. (Q2, 1-60; SS, Al-b, Ti-b, 4-53)

736-Q. **Elastic-Plastic Analysis of Scabbing in Materials.** Sudhir Kumar and Norman Davids. *Franklin Institute, Journal,* v. 265, May 1958, p. 371-383.

"Scab" refers to the pieces of various shapes and sizes which fracture from a solid material when a sudden pressure of high intensity,

such as an explosion, is applied. A bar of 14S-T4 Al alloy is investigated. 17 ref. (Q26, Al)

737-Q.* Hot Strength Properties of Filamentary Nickel Alloys. Bernard Wolk. *IRE Transactions on Electron Devices,* v. ED-5, no. 2, Apr. 1958, p. 58-65.

Several Ni and Co base alloys (with such elements as Al, W, Cr) were tested for hot strength because of their possibilities as efficient primary electron emitters (when coated with alkaline earth oxides). Diameters of filaments were all 0.001 in. or less. (Q27a, 2-62; Ni-b, Co-b, 4-61)

738-Q. Effects of Radiation Environment on Structural Metals. Alvin Boltax. *Electrical Manufacturing,* v. 61, June 1958, p. 125-133.

15 ref. (Q-general, 2-67, 17-51; SGB-s)

739-Q. Evaluation of Niobium Alloys as High-Temperature Materials. W. S. Hazelton. *Machine Design,* v. 30, May 15, 1958, p. 150-152.

Properties of columbium compared to those of established alloys to evaluate the metal as a structural material for high-temperature use. (Q-general, 17-57; Cb-b, SGA-h)

740-Q. Thermal Stresses in Design. Pt. 1. Appraisal of Brittle Materials. S. S. Manson. *Machine Design,* v. 30, June 12, 1958, p. 114-120.

Failure criteria, thermal shock in flat plates, thermal shock parameters. 7 ref. (Q10a, Q26s)

741-Q. Manufacture of Pressure Vessels. H. Harris. *Nuclear Power,* v. 3, May 1958, p. 210-212.

Problems of brittle fracture. (Q26s, T26q; ST)

742-Q.* Annealing in Slip Bands in Copper Fatigued at 90° K. D. Hull. *Philosophical Magazine,* v. 3, May 1958, p. 513-518.

Number of slip bands formed during fatigue of O.F.H.C. copper compared at 90° K. and 293° K. For equivalent stresses to cause failure more slip bands are formed at 90° K. than at 293° K. The number of slip bands formed increases with the length of the test. 6 ref. (Q24a, Q7; Cu)

743-Q.* The Influence of Vacancies Upon the Internal Friction of Polycrystalline Copper. R. S. Barnes, N. H. Hancock and E. C. H. Silk. *Philosophical Magazine,* v. 3, May 1958, p. 519-526.

Neutron irradiation, gamma irradiation and quenching all change the internal friction of pure polycrystalline rods of Cu. Only if the rods are initially given an anneal near the melting point for many hours do these three treatments give consistent and similar results, and then the logarithmic decrement is reduced. 16 ref. (Q22, 2-67; Cu-a)

744-Q.* The Effects of Neutron Irradiation Upon the Internal Friction of Copper Single Crystals at Liquid Nitrogen Temperatures. R. S. Barnes and N. H. Hancock. *Philosophical Magazine,* v. 3, May 1958, p. 527-530.

The internal friction of Cu single crystals remains unaffected by a short neutron bombardment at −195° C. if no warning is allowed before measurement. Successive pulse anneals produce no marked change until 23° C. is reached, when the internal friction is greatly reduced. 6 ref.

(Q22, 2-67, 2-63; Cu-a, 14-61)

745-Q.* New Coefficients Predict Wear of Metal Parts. Ernest Rabinowicz. *Product Engineering,* v. 29, June 23, 1958, p. 71-73.

Effects of galling, poor oil, dust, surface cracks. Magnitude of wear can be predicted with simple general equations. Sliding may give one or a combination of four forms of wear: adhesive, abrasive, corrosive and surface fatigue. Wear coefficients can be read from a conversion chart when friction coefficient and velocity of sliding surfaces are known. Equations apply to adhesive and abrasive wear. No simple expression for corrosive wear has appeared and no clear-cut wear rate exists for surface fatigue. (Q9)

746-Q.* Analysis of Elasto-Plastic Behavior of Metals by Means of Photoelastic Coating Method. Kozo Kawata. *Scientific Research Institute, Journal,* v. 52, Mar. 1958, p. 17-40.

Thin films of photo-elastic material bonded to metal surfaces may provide a means of measuring the elasto-plastic strain distribution along the surface of metal. A new photo-elastic material, epoxy-polysulphide copolymer (epoxy rubber) is studied for use at room temperature. This polymer has suitable properties, such as large maximum elongation, low Young's modulus, high strain-optical sensitivity and high bonding strength to metal surfaces. 7 ref. (Q21, 1-54)

747-Q. Some Properties of Neptunium Metal. *Soviet Journal of Atomic*

Energy, v. 3, 1957, p. 956-957. (Translation by Consultants Bureau, Inc.)

The ultimate tensile strength of neptunium, determined from the stress-strain curve and the empirical relationship between hardness and tensile strength lines within the limits of 124-138 kg. per sq. mm. (Q27, Q29; Np)

748-Q. Relaxation of Nonoriented Microstresses. Pt. 2. B. M. Rovinskii and V. G. Liutsau. *Soviet Physics, Technical Physics*, v. 2, 1957, p. 2005-2008. (Translation by American Institute of Physics, Inc.)

Curves obtained for the recovery of X-ray diffraction line breadth of plastically deformed pure metals (Al, Cu) at room temperature. Study shows that changes in the breadth of the lines with time are due basically to the relaxation of nonoriented microstresses. 8 ref. (Q24, Q25; Al-a, Cu-a)

749-Q.* Variables Affecting the Thermal Stability of Three Titanium Alloys. F. R. Schwartzberg, D. N. Williams and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 3-13.

Effects of variations in stress, strain, time and temperature during thermal exposure on the tendency toward thermal instability in Ti-2Mo-2Cr-2Fe, Ti-6Al-4V, and Ti-4Al-4Mn alloys. Alloys were vacuum annealed and given a stabilizing heat treatment. None showed evidence of instability over a wide range of exposure conditions. Tests showed that a contaminated surface skin could lead to some embrittlement in Ti-2Mo-2Cr-2Fe but not in Ti-6Al-4V or Ti-4Al-4Mn. (Q10a, 2-62; Ti-b)

750-Q.* The Effect of Temperature on the Uniform Elongation of Titanium Alloys. F. C. Holden, H. R. Ogden and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 14-31.

Limits of uniform elongation were measured for typical alpha, alpha-beta and beta alloys in three microstructural conditions over a temperature range from −75 to 300° C. Highest uniform elongation was obtained for commercial Ti (alpha); low for the beta-quenched 7.5 Cr, 7.5 Mo alloy. Presence of massive alpha in the alpha-beta alloys increases their uniform elongation. Dependence on temperature is marked, particularly in the two-phase alloys. (Q27a, 2-61; Ti-b)

751-Q.* The Effect of Composition and Annealing Treatment on the Thermal Stability of Chromium-Molybdenum Alloys of Titanium. H. R. Ogden, F. C. Holden and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 32-47.

Annealing treatments originating in the beta field produce a stable condition more rapidly than in the alpha-beta field. Instability in a 5% Cr alloy is related to the formation of eutectoid products. Substitution of Mo for half of the Cr retards the eutectoid reaction resulting in a more stable condition. Small additions of oxygen to the Cr-Mo alloys do not appear to affect stability. (Q10a, 2-60, 2-64; Ti-b, *Cr, Mo*)

752-Q.* Elevated-Temperature Properties of the 6 Per Cent Aluminum, 4 Per Cent Vanadium Titanium Alloys. W. M. Parris, R. G. Sherman and H. D. Kessler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 48-64.

Short-time tensile data at temperatures to 1000° F. Notched and unnotched stress-rupture data at 750, 850 and 950° F. for a mill-annealed condition and a high-strength heat treated condition. Creep test results including design curves showing 0.1, 0.2, 0.5, 1.0 and 5.0% creep at 650, 750 and 850° F. to 1000 hr. The 6 Al, 4 V alloy is metallurgically stable under stress to 950° F. and has good creep resistance to at least 850° F. (Q27a, Q3m, 2-62; Ti-b)

753-Q.* Development of Titanium Base Alloys for Elevated Temperature Applications. F. A. Crossley, W. F. Carew and H. D. Kessler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 65-112.

Tension, creep-rupture and stability test results. Survey of hot tensile properties of binary alloys indicated Al to be the best metallic strengthener on a weight per cent basis. Creep-rupture tests on 33 ternary alloys. Effect of additions of carbon, nitrogen and oxygen on creep-rupture properties. The most creep resistant alloy developed having good tensile ductility and stability is the 7 Al, 3 Mo alloy. 22 ref. (Q27a, Q3m, 2-62; Ti-b)

754-Q.* The Effects of Carbon and Nitrogen Contamination on the Notch Tensile Properties of Titanium. E. P. Klier and N. J. Feola. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 113-123.

Notch sensitivity of unalloyed Ti as determined in the notch tension test differs from that measured in the Charpy V-notch impact test. The ductile-brittle transition in the notch tension test occurs at a much lower testing temperature than for the impact test. At a testing temperature of −100° F. neither 0.26% carbon nor 0.23% nitrogen leads to embrittlement in the notch tensile test. 9 ref. (Q23s, Q6, 2-63; Ti)

755-Q.* A Micro Notched-Bar Impact Test for Titanium Alloys. F. C. Holden, H. R. Ogden and R. I. Jaffee. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 124-129.

Behavior of the micro-impact test compared with that of the V-notch Charpy test over a temperature range from −196 to 300° C. for AISI 8745 steel, austenitized, 2017-T4 (17S) aluminum and 70-30 brass, both in the annealed condition, commercial Ti, and two Ti alloys (7 Mn and 4 Mn, 4 Al).

(Q6, 1-54; Ti, AY, Al, Cu-n)

756-Q.* The Measurement of Elastic Modulus of Titanium Alloys. W. H. Graft and W. Rostoker. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 130-144.

Fundamentals of dynamic test methods; use of an electrostatic dynamic plastic modulus device. 6 ref. (Q21, 1-54; Ti-b)

757-Q.* Unalloyed Titanium Is Improving. H. H. Barry and L. Schapiro. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 161-163.

Histogram of specification properties of yield strength, ultimate strength and elongation for 1000 consecutive sheets at Douglas Aircraft. (Q27a; Ti, 4-53)

758-Q.* Properties and Fabrication Characteristics of Wrought Titanium Products. Leston B. Stark. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 170-182.

Mechanical property data and fabrication limits for Ti alloy sheet and extrusions; comments on forgings and their fabrication limits.

(Q-general, Q23q; Ti, 4-51, 4-53, 4-58)

759-Q.* Development of Standardized Specimen Preparation and Testing Techniques for Unalloyed Titanium Sheet. R. L. Folkman and M. Schussler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 183-196.

Variables in specimen preparation and testing techniques, and their effects on mechanical properties. Variables included melting (furnace pressure, atmosphere, electrode type and ingot size); rolling (sheet bar conditioning, hot rolling temperature); heat-treating (annealing temperatures and times); finishing (amount of surface removal by pickling); testing (strain rate and sample orientation).

(Q-general, 1-60; Ti, 4-53)

760-Q.* (Russian.) **Peak of Internal Friction in High Chromium-Nickel Steel Associated With Hydrogen Diffusion Is Caused by Stresses.** Kun Chin-Pin and Ke Tin-Sui. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 82-90.

Preparation of sample, method of testing, and effect of hydrogenation and of de-hydrogenation, effect of various temperatures, measurement of energy of activation and evaluation of results.

7 ref. (Q22, 3-66; SS, *H*)

761-Q.* (Russian.) **Investigation of Annealed Steel by Internal Friction.** I. N. Chernikova. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 102-105.

It was determined by torsional vibration that internal friction is related to various heat treatments of carbon steels of different carbon content. The frequency of specific vibration is about one Hertz. The peak at 200° may be characterized as a relaxation process attendant on the exit of carbon from solid solution of alpha iron during annealing. This peak rises with carbon content and lessens with temperature of annealing.

5 ref. (Q22, 2-64; CN)

762-Q.* (Russian.) **Elongation Caused by Bending.** Yu. E. Bondarev. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 106-109.

Characteristic stretching properties of metals control their tendency toward stiffening and determine under various conditions the extent which their volume is changed. Metals with greater uniform elongation may be bent through a greater angle than those with less uniform elongation. Bending is limited to a large extent by the inability of the metal to elongate. 5 ref. (Q5)

763-Q.* (Russian.) **Delayed Failure of Hardened Steels.** A. L. Nemchinskii. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 110-112.

Destructive extension of cracks begins when the tensile energy is suddenly released, grows into great force and is spent in expanding the crack. The resistance-time curve plotted from experimental results has two parts: inclined and horizontal. The inclined part seems to be determined by thermodynamics, and the horizontal by kinetics. 9 ref. (Q26; ST)

764-Q. (Russian.) **Influence of Ingot Weight on Quality of Structural Steels.** M. I. Kolosov, I. Ya. Aizenshtok, A. I. Komissarov, G. E. Mysina and M. S. Povolotskaya. *Stal'*, v. 18, May 1958, p. 411-414.

Lower mechanical properties of larger ingots (intercrystalline cracking). (Q-general; ST, 5-59, 9-72)

765-Q.* (Russian.) **Examination of Quality of Continuously Cast Transformer Steel.** N. M. Lopatyshskin, V. S. Rute and G. V. Gursky. *Stal'*, v. 18, May 1958, p. 417-425.

Plasticity of steel at high temperature; surface properties of castings; cooling methods; macrostructure and microstructure; nonmetallic inclusions and chemical heterogeneity; rolling and heat treatment; physical and mechanical properties of sheets.

(Q-general, D9q; ST, SGA-n)

766-Q.* (Russian.) **Influence of Aluminum Nitride on Quality of Cast Steel.** D. K. Butakov. *Stal'*, v. 18, May 1958, p. 457-463.

Behavior of aluminum nitride in steels; experimental technique; experiments in quartz chamber; experiments with air blowing. Effect of casting method, cooling speed, annealing at high temperature and forging. Unfavorable influence of aluminum nitride on mechanical properties of steel and preventive measures. 7 ref.

(Q-general, 2-60; ST, 5-60)

767-Q. Thermal Creep Design Criteria. Robert Goldin. *Aeronautical Engineering Review*, v. 16, Dec. 1957, p. 36-41.

7 ref. (Q3, T24, 17-51)

768-Q. Direct Stress Fatigue Tests on Redux-Bonded and Riveted Double Strap Joints in 10 S.W.G. Aluminum Alloy Sheet. S. Kelsey and J. B. Spooner. *Aeronautical Research Council*, C. P. no. 353, Dec. 1955, 48 p.

Bonded joints tended to fail by shear of the bond at the higher stress ranges and by tension of the sheet at the lower stress ranges. Riveted joints failed by tension across the first row of rivets in all cases, though tests on three-row riveted joints showed considerable improvement in endurance over those with two rows of rivets. Endurances were greater for bonded joints but with rather more scatter than for riveted joints.

(Q7d; Al-b, 4-53, 7-53, 7-58)

769-Q. Size Effects in Slow Notch-Bend Tests of a Nickel-Molybdenum-Vanadium Steel. J. D. Lubahn and S. Yukawa. *American Society for Testing Materials, Preprint*, no. 79, 1958, 16 p.

13 ref. (Q5h; AY, *Ni, Mo, V*)

770-Q. A Mechanism for Nonpropagating Fatigue Cracks. L. F. Coffin, Jr. *American Society for Testing Materials, Preprint*, no. 72, 1958, 6 p.

7 ref. (Q7f; ST)

771-Q. Hysteresis and Anelasticity in Cold-Worked Stainless Steel. J. D. Lubahn. *American Society for Testing Materials, Preprint*, no. 77, 1958, 11 p.

Creep and cyclic loading tests on cold stretched stainless steel show that the hysteresis in cyclic loading is not an anelasticity phenomenon. Practical significance of this hysteresis as a possible source of damping. 12 ref. (Q22, Q3; SS)

772-Q. Preparation and High-Temperature Properties of Nickel-Al_2O_3 Alloys. Walter S. Cremens and Nicholas J. Grant. *American Society for Testing Materials, Preprint*, no. 83, 1958, 17 p.

Nickel-Al_2O_3 alloys were tested in tension at room temperature and in creep rupture at 1300 to 1800° F. The interparticle spacing of the Al_2O_3 in the alloy is related to the measured mechanical properties. 15 ref. (Q27a, Q3m; Ni, Al, 6-70)

773-Q. Temperature and Time Stability of M257 and SAP Aluminum-Aluminum Oxide Alloys. W. S. Cremens, E. A. Bryan and N. J. Grant. *American Society for Testing Materials, Preprint*, no. 84, 1958, 7 p.

The 6 to 8% Al_2O_3 (M257) alloy and the 10 to 14% Al_2O_3 (SAP) alloy in the system Al-Al_2O_3 were cold worked up to 66 and 29%, respectively, after which they were annealed for various periods of time near the melting point. The effect of cold work, annealing time and temperature on the resultant tensile, yield and ductility values are re-

ported; effect on the 600° F. stress-rupture properties.
(Q23, Q27, Q3m, 3-68, 2-64; Al, 6-70)

774-Q. Low Temperature Effects on Metals. J. Waring. *Australasian Engineer,* v. 50, Nov. 7, 1957, p. 73-79.
(Q-general, 2-63)

775-Q. High Temperature Properties of 18-12-1 Cr-Ni-Nb Steel. *British Electrical and Allied Industries Research Association,* J/T169, Oct. 11, 1956, 22 p.
For boilers. (Q-general, 2-62, T26q, 17-57; SS)

776-Q.* Plastic Flow and Fracture of a Brittle Material (Grey Cast Iron) With Particular Reference to the Effect of Fluid Pressure. B. Crossland and W. H. Dearden. *Chartered Mechanical Engineer,* v. 5, Mar. 1958, p. 103-105.
Torsion tests on centrifugally cast gray iron specimens protected with a rubber film were carried out at pressures up to 35 tons per sq. in., and for large strains the shear stress against over-all strain derived from these tests is shown. 7 ref.
(Q26, Q24, Q1, 3-74; CI-n, 5-65)

777-Q.* The Latest Edgar Allen Special Alloy Tool Steels. *Edgar Allen News,* v. 37, Mar. 1958, p. 56-57.
Description of A.M. 3 die steel, a Cr-Mo-V alloy, Lominium steel, a Mn-Cr-V alloy, A.M. 1 die steel, and Maxnap steel, designed for rivet snaps. (Q-general; TS)

778-Q. Probability Theory of Fatigue. A. Ferro and R. Colombo. *Engineers' Digest,* v. 18, Nov. 1957, p. 487-490. (From *Metallurgia Italiana,* no. 7, 1957, p. 518-522.)
Previously abstracted from original. See item 1053-Q, 1957.
(Q7, S12)

779-Q. Mixed-Blast Basic-Bessemer Steels. A. Kruger and E. Schmidtmann. *Iron and Coal Trades Review,* v. 176, Mar. 7, 1958, p. 577-581. (From *Stahl und Eisen,* Dec. 26, 1957, p. 1868-1873.)
Previously abstracted from original. See item 246-Q, 1958.
(Q-general; ST-g)

780-Q. Determination of Residual Stresses in Titanium Carbide-Base Cermets by High-Temperature X-Ray Diffraction. Herbert W. Newkirk, Jr., and Harry H. Sisler. *Journal of American Ceramic Society,* v. 41, Mar. 1958, p. 93-103.
Crystal structure and thermal expansion of titanium carbide, Ni, and two Ti carbide-base cermets between room temperature and 1100° C. 19 ref.
(Q25h, M27, P11g; Ti, Ni, 6-70)

781-Q.* Experimental Study of Initial and Subsequent Yield Surfaces in Plasticity. P. M. Naghdi, F. Essenburg and W. Koff. *Journal of Applied Mechanics,* v. 25, June 1958, p. 201-209.
Experimental results for 25 tubular specimens of a 24S-T4 Al alloy, subjected to combined torsion-tension and reversed torsion, are reported in a study of the initial and two subsequent yield surfaces covering the first and the fourth quadrant of the axial stress-shear stress plane. 14 ref. (Q21d, Q1; Al-b, 4-60)

782-Q.* Strain-Aging, Work-Hardening, and Inhomogeneous Deformation in Armco Iron After Static and Dynamic Deformation. H. P. Tardif and W. Erickson. *Journal of Applied Mechanics,* v. 25, June 1958, p. 285-287.
Under compression impact the work hardening produced is less than that produced by the same amount of statically applied strain. Hardness is not uniform throughout the length of the specimens.
(Q24, Q23a, N7e; Fe-a)

783-Q. Tightening and Tensile Tests on Joints Assembled With Bolts Threaded BSW, BSF, UNC and UNF. J. E. Field. *Machinery (London),* v. 92, June 1958, p. 1381-1394, 1425.
Unified Fine Threads, British Standard Fine Threads, Unified Coarse and British Standard Whitworth Threads. (Q27, T7f; 7-54)

784-Q.* Creep of Annealed Nickel, Copper, and Two Nickel-Copper Alloys. William D. Jenkins and Carl R. Johnson. *National Bureau of Standards, Journal of Research,* v. 60, Mar. 1958, p. 173-191.
Creep tests were made in tension under constant loads at temperatures of 300 to 900° F. on initially annealed specimens of Ni, Cu, 70-30 Ni-Cu alloy and 30-70 Ni-Cu. Tests at 1200° F. were also made on the Ni and the two alloys. Influence of rate of loading on the creep stress and of prior thermal mechanical history on the creep behavior of the alloys at several selected temperatures. 25 ref. (Q3, 2-64; Ni, Cu)

785-Q.* Preliminary Studies of Rolling-Contact Fatigue Life of High-Temperature Bearing Materials.

Thomas L. Carter. *National Advisory Committee for Aeronautics,* NACA RM E57K12, Apr. 1958, 27 p.

Investigation was made in the rolling contact fatigue spin rig. Vacuum melting improved fatigue life for AISI M-1 toolsteel, for both balls and races; further Al and Si additions, with or without Mo, to the basic SAE 52100 composition improved fatigue life with no apparent change in cleanliness. No correlation of rolling-contact fatigue life with cleanliness was obtained. 6 ref. (Q7a; AY, SGA-c)

786-Q.* Unloading Effects in the Plastic Properties of Copper Single Crystals. M. J. Makin. *Philosophical Magazine,* v. 3, Mar. 1958, p. 287-301.

Yield point phenomena occur on retesting Cu single crystals during interrupted tensile deformation. The effect is observed only during the linear and parabolic regions of the stress-strain curve and the size of the yield drop is directly proportional to the reduction in the stress on unloading. 9 ref.
(Q24c; Cu, 14-61)

787-Q.* The Temperature Dependence of Flow Stress in Copper Single Crystals. M. J. Makin. *Philosophical Magazine,* v. 3, Mar. 1958, p. 309-311.

Crystals were tested in a hard beam tensile machine at a strain rate of 6×10^{-5} per sec. Measurements were made between −195 and −159° C., −115, −78, −51, −30 + 84 and +196° C. Results confirm that the ratio of the flow stresses at two temperatures settles down after about 10% elongation to a constant value.
(Q24, Q25n; Cu, 14-61)

788-Q. Primary Creep in Aircraft Design. B. B. Muvdi and C. J. Giemza. *Society of Automotive Engineers, Preprint,* v. 46A, Apr. 1958, 16 p.

19 ref. (Q3, T24, 17-51; SS, Al-b, Ti-b)

789-Q.* Problems Relating to the Need for Heat Tolerant Materials in Aerodynamic Applications. P. W. Rowe. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 4-20.

Principal problems facing the airframe designer are high-temperature elongation, reduction of strength, reduction of the modulus of elasticity, creep, corrosion, erosion and melting. 15 ref.
(Q-general, 2-62, R-general, T24a; SGA-h)

790-Q.* Metals for Structures Exposed to Aerodynamic Heating. Wolfgang H. Steurer. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 21-47.

Age hardening, transformation heat treatment, cold working and other strengthening treatments for short-time, high-temperature exposure. 16 ref.
(Q27a, 2-62, J-general, Q23a, T24)

791-Q.* Materials Property Requirements and Test Methods for Aerodynamic Applications. Louis Luini. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 48-95.

High-temperature tensile, creep, rupture, relaxation fatigue, oxidaiton, abrasion and erosion tests. New types of creep resistant alloys consist mainly of a base containing a combination of Ni, Cr, Fe and Co, to which various strengthening elements such as C, Mo, W, Ti and Ta are added. 18 ref.
(Q-general, 2-62, 1-54, T24; SGA-h)

792-Q.* The Light Metals—Aluminum, Magnesium, Titanium. R. R. Kennedy. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 202-216.

Extensive review of high-temperature properties in connection with aircraft applications. Field of usefulness of the light metals is in the moderate temperature range. 6 ref.
(Q-general, 2-62, T24; Al, Mg, Ti)

793-Q.* Nickel and Cobalt Base Alloys. F. S. Badger and G. A. Fritzlen. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 234-260.

Physical, mechanical and thermal properties with particular reference to Hastelloy C, Hastelloy R-235, Hastelloy X, Inconel, Inconel X, Nimonic 75, Nimonic 80A, Haynes no. 25, Haynes Multimet, J-1570. 24 ref.
(Q-general, P-general, 2-62; Ni-b, Co-b)

794-Q.* The Properties of Eleven Less Common Metals. B. A. Rogers. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 261-314.

Mechanical and physical properties of chromium, columbium, hafnium, iridium, molybdenum, osmium, rhenium, tantalum, tungsten, vanadium and zirconium in connection with aircraft applications. Fabrica-

tion problems. 128 ref.
(Q-general, P-general, T24; Cr, Cb, Hf, Ir, Mo, Os, Re, Ta, W, V, Zr)

795-Q.* Fundamentals of Metal-Ceramic Combinations (Cermets). Henry H. Hausner. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 315-339.

High melting temperatures of the oxides, carbides and borides of Ti, Zr, V, Nb, Ta, Cr, Mo, W, Th, and their high strength at elevated temperatures permit application of cermets for high-temperature purposes and as aircraft construction. 19 ref. (Q-general, 2-62, T24, 17-57; SGA-h, 6-70)

796-Q.* Specific Ceramics and Cermets of Promise. Malcolm F. Judkins. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 340-352.

Refractory materials for use at high temperatures must retain strength and structural integrity at service temperatures; resist erosion and corroison; resist thermal and mechanical shock at all temperatures; be light weight for aircraft rocket and nozzle applications. Available data on oxides, carbides, borides, nitrides, silicides, titanides, cermets and intermetallic compounds. 21 ref. (Q-general, H-general, 2-62; SGA-h, 6-70)

797-Q.* Review, Summary and Evaluation. J. R. Townsend. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 353-362.

Critical summation of each of the 11 papers together with a correlation of the main points.
(Q-general, 2-62, T24, 17-57; SGA-h)

798-Q.* Performance of Materials at Elevated Temperatures for Aircraft and Missile Applications. Alan V. Levy. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 369-399.

Short-time tensile, creep, stress-rupture and physical properties of Al, Mg, Ti and Mo alloys, stainless steel, high-temperature alloys, age hardenable stainless steels and alloy steels presented in tabular form. Several promising new alloys discussed. 16 ref.
(Q27a, Q3m, P-general; SGA-h)

799-Q. Comparison of the Abrasive Properties of Grains of Minerals by the Method of Mutual Grinding. V. N. Kashcheev. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 1001-1008. (Translation by American Institute of Physics, Inc.)

The ratio of the losses of weight or of volume of two materials ground against each other depends on the abrasive used. This dependence is the stronger, the larger the differences of the mechanical properties of the two materials undergoing mutual grinding. 9 ref.
(Q9, 1-54)

800-Q. Laws Governing Lubrication When Metals Are Worked Under Pressure. S. Ia. Veiler and V. I. Likhtman. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 989-995. (Translation by American Institute of Physics, Inc.)

Study of metal flow and elastic rebound effect in the presence of lubricants in the processes of wire-drawing and shell drawing. 9 ref.
(Q24, F28, G4, 18-73)

801-Q. Testing the Scratch Resistance of Metals. M. M. Tenenbaum. *Soviet Physics, Technical Physics,* v. 2, 1957, p. 1006-1015. (Translation by American Institute of Physics, Inc.)

Investigation into the scratch method using a trihedral diamond point for testing the mechanical properties of metals and alloys, as distinct from the properties determined by microhardness. 18 ref.
(Q29d)

802-Q. (English.) **Fatigue Tests on Basic Bessemer and Openhearth Steels.** Alfred Funck. *Acier-Stahl-Steel,* Jan. 1958, p. 19-24.

9 ref. (Q7a; ST-e, ST-g)

803-Q.* (English.) **On the Fracture of Aluminum Polycrystals.** Minoru Okada and Hiroshi Fujita. *Osaka University, Technology Reports,* v. 6, Oct. 1956, p. 329-344.

Nature of fracture studied in terms of the stress rate (loading speed). With an increase in loading speed the spacing of slip bands and the number of fine structures in each slip band are decreased, but the elastic limit, the rate of strain hardening, the heterogeneity of deformation in short range, the interaction of adjacent grains, the rate of fragmentation, the necking stress and the homogeneity of deformation all over the specimen are increased respectively. 8 ref.
(Q26, Q24; Al)

804-Q. (English.) **Fatigue of Metals. Pt. 2.** C. E. Phillips. *Teknisk Ukeblad,* v. 105, Feb. 20, 1958, p. 169-175.

Influence of notches and stress gradients; theories of failure; design considerations. (Q7)

805-Q. (German.) **Determination of Notch Bar Toughness.** Vladimir Komarek. *Acta Technica,* no. 1, 1958, p. 26-56.

4 ref. (Q27d)

806-Q. (German.) **Influence of Various Alloying Additions on the Elastic Properties of Copper Alloys.** *Draht Fachzeitschrift,* v. 9, Mar. 1958, p. 90-91.

(Q21, 2-60; Cu-b, AD-n)

807-Q. (German.) **Radioactive Measurement of Wear During Machining.** O. Hake. *Industrie-Anzeiger,* v. 80, Apr. 4, 1958, p. 15-24.

(Q9, 1-60, G17)

808-Q. (German.) **Structure and Mechanical Properties of Copper-Chromium and Copper-Zinc-Chromium Alloys.** Nurettin Cuhadar. *Istanbul Teknik Universitesi Bulteni,* v. 10, no. 3, 1957, p. 3-30.

6 ref. (Q-general, M27; Cu-b, Cr-b, Zn-b)

809-Q. (German.) **Damping of Metals.** R. Fichter. *Schweizer Archiv,* Mar. 1958, p. 65-78.

26 ref. (Q8)

810-Q. (German.) **Light Alloys.** Paul Krekel. *VDI Zeitschrift,* v. 100, Apr. 11, 1958, p. 463-464.

Aluminum forgeable alloys and casting alloys. (Q-general; Al-b)

811-Q. (Japanese.) **Change of Rigidity of Pure Silver Wire by Cold Work and Subsequent Annealing.** Jun Kuroyanagi. *Japan Journal of Applied Physics,* v. 27, Apr. 1958, p. 201-211.

32 ref. (Q23p, 2-64, 3-68; Ag, 4-61)

812-Q.* (Rumanian.) **Contribution to Study of the Hardening of Aluminum by Small Percentages of Alloying Elements.** Marius Protopopescu. *Studii si Cercetari de Metalurgie,* v. 2, no. 4, 1957, p. 425-446.

The effect of small amounts of Zn, Mg, Cu and Mn on the electrical resistivity and Brinell hardness of commercial Al of 99.75% purity. Electrical resistivity increases almost linearly after which the variation is parabolic. Simultaneous large electrical conductivity with optimum mechanical properties can be obtained by suitably varying the aging temperature of the quenched specimen and the cross-section reduction in wiredrawing immediately after quenching. 11 ref. (Q29n, P15g, 2-60; Al-a, *Cu, Mg, Mn, Zn*)

813-Q. (Russian.) **Abrasive Wear of Steels in Reciprocating-Rotary Motion.** R. M. Matveyevskii. *Vestnik Mashinostroenia,* May 1958, p. 31-35.

(Q9; ST)

814-Q. (Russian.) **Increasing the Fatigue Strength of Large Machine Parts.** I. G. Sokolov. *Vestnik Mashinostroenia,* May 1958, p. 47-50.

Results of various methods of heat treatment on the fatigue strength of forged steel machine parts. (Q7a, 2-64; ST, 4-51)

815-Q. (Book.) **Metals for Supersonic Aircraft and Missiles.** 432 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $7.50.

Proceedings of the Conference on Heat Tolerant Metals for Aerodynamic Applications held Jan. 28 and 29, 1957, at the University of New Mexico, Albuquerque. Papers abstracted separately.
(Q-general, 2-62; T24, 17-57; SGA-h)

816-Q. (Book.) **Metals.** 175 p. 1956. American Society for Testing Materials, STP no. 196, 1916 Race St., Philadelphia 3, Pa. $4.50.

Eleven papers, with discussions, presented at 2nd Pacific Area National Meeting ASTM, Los Angeles, Sept. 17-21, 1956. Papers, mainly concerned with fatigue, abstracted separately. (Q7)

817-Q. (Book.) **Elevated-Temperature Properties of Wrought Medium-Carbon Alloy Steels.** 128 p., Jan. 1957, American Society for Testing Materials, STP no. 199, 1916 Race St., Philadelphia 3, Pa. $4.25.

(Q-general, 2-62; AY)

818-Q. (Book.) **Fatigue of Aircraft Structures.** 100 p. 1956. American Society for Testing Materials, STP no. 203, 1916 Race St., Philadelphia 3, Pa. $2.75.

Six papers presented at Second Pacific Area National Meeting of the ASTM, Los Angeles, Sept. 16-21, 1956. Papers abstracted separately. (Q7, T24)

819-Q. (Book.) **Symposium on Titanium.** 208 p. 1958. American Society for Testing Materials, STP no. 204, 1916 Race St., Philadelphia 3, Pa. $4.75.

Fourteen papers from Second Pacific Area National Meeting ASTM, Los Angeles, Sept. 1956, on testing

techniques and effects of various heat treatments on the properties and characteristics of Ti and Ti alloys. Papers abstracted separately. (Q-general; Ti)

820-Q. (Book.) **Symposium on Large Fatigue Testing Machines and Their Results.** 151 p. 1958. American Society for Testing Materials, STP no. 216, 1916 Race St., Philadelphia 3, Pa. $4.25.

Papers abstracted separately. (Q7, 1-53)

821-Q. (Book.) **Proceedings of the 1955 Sagamore Research Conference on Strength Limitations of Metals.** Syracuse University Research Institute. 2 v., 399 p., Mar. 1956. U. S. Office of Technical Services, PB 131280, PB 131281, Washington 25, D. C. $10.50.

Twenty papers presented at Army Ordnance Corps. Research Conference held at Sagamore Lake, N. Y., Aug. 24-26, 1955. Papers abstracted separately. (Q27)

822-Q.* (German.) **Determination of Radiographic Value of Elastic Constant on Cold Rolled Armco Iron and Chromium-Molybdenum Steel.** Eckard Macherauch and Paul Müller. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 257-260.

Possible ways to determine elastic constant on the basis of elasticity theory. Two precise methods using radiographic measurements of lattice dimension. Tension experiments on Armco iron. Tension-pressure experiments on a Cr-Mo steel. (Q21, 1-54; Fe-a, AY, *Cr, Mo*)

822-Q. (Dutch.) **Material Problems Related to Brittle Fracture in Supertankers.** Georg Vedeler. *Lastechniek,* v. 24, May 1958, p. 76-84. 13 ref. (Q26s, T22, T26q; ST)

823-Q.* **Relation of Microhardness and Stresses in Copper Alloys.** P. J. LeThomas. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 41-48.

Microhardness of Cu or Cu alloys was measured in the proximity of cracks or break areas. When the test piece has been subjected to mechanical constraints, the microhardness reaches abnormal value in these regions. (Q29q, Q25; Cu)

824-Q.* **Ductile Iron—Alloyed and Normalized.** C. R. Isleib and R. E. Savage. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 75-83.

Mechanical properties were determined for four types of ductile iron: unalloyed, with Ni, Ni-Mo and Ni-Mo-V. Three conditions of heat treatment investigated: as cast; normalized; and normalized and tempered. 5 ref. (Q-general, 2-60, 2-64; CI-r)

825-Q.* **Transfer of Tungsten Carbide to Soft Metals During Single-Traverse and Reciprocating Sliding.** J. Golden and G. W. Rowe. *British Journal of Applied Physics,* v. 9, Mar. 1958, p. 120-121.

A small radioactive tungsten carbide hemisphere was slid slowly over Cu and steel plates. The tungsten carbide transferred to the plates was assessed by counting and autoradiography. On well-prepared Cu about 50×10^{-12} g. was transferred steadily to each mm. of track during a single traversal. This carbide was firmly embedded in the Cu, even after several traversals in each direction. Single traversals on mild and stainless steels also produced steady embedded wear, but with reciprocating traversals a considerable portion of the carbide was scattered loosely on the surface. (Q9; Cu, CN, SS, W, 6-69)

826-Q.* **A "Super-Elastic" Single Crystal Calibration Bar.** W. A. Rachinger. *British Journal of Applied Physics,* v. 9, June 1958, p. 250-252.

Elastic strains of up to 4% can be attained in a Cu-Al-Ni alloy in the form of a single crystal suitably heat treated. The high elasticity is due to a reversible martensite transformation induced by stressing. Methods of production and heat treatment of large crystals; details of mechanical properties. The alloy can be machined by conventional methods. Suggestions for development of other superelastic alloys. 5 ref. (Q21; Cu, Al, Ni, 14-61)

827-Q.* **Some Factors Affecting the Toughness of Mild Steel Castings.** Herbert H. Fairfield and John A. Ortiz. *Modern Castings,* v. 34, July 1958, p. 70-74.

Influence of sulphur, carbon and hydrogen on ductility; effects of various steelmaking operations. All reduction of area values quoted (used as the measure of toughness) are from separately cast test bars which have been normalized from 1650° F. and drawn for 8 hr. at 1250° F. 16 ref. (Q23p, 2-60; CN, 5-60)

828-Q.* Plastic Deformation of Nickel Single Crystals at Low Temperatures. Peter Haasen. *Philosophical Magazine,* v. 3, Apr. 1958, p. 384-418.

Single crystals of Ni (purities 99.98 and 99.4%) were deformed in tension at various temperatures between 4.2 and 300° K. Shear stress-shear strain relations, and reversible change of flow stress with temperature. The work-hardening parameters obtained are discussed in terms of dislocation theory developed mainly on the basis of data on Al and Cu. From the temperature dependence of the stress at the beginning of dynamical recovery the activation energy of cross-slip is estimated to be slightly lower than that of Cu, implying a somewhat higher stacking fault energy. 40 ref. (Q24, 263; Ni, 14-61)

829-Q.* The Cleavage of Metal Single Crystals. A. N. Stroh. *Philosophical Magazine,* v. 3, June 1958, p. 597-606.

A model of cleavage applicable to metals cleaving on the slip plane is developed in which a crack is initiated at the end of a low-angle tilt boundary terminating inside the crystal. The strength of the metal is determined by the difficulty of growth of the crack. Satisfactory agreement is obtained with the experimenfal results for Zn. 10 ref. (Q26n; 14-61)

830-Q. Ultra High Strength, Heat Resisting Steel. John C. Hamaker. *Society of Automotive Engineers, Preprint* S67, Mar. 1958, 12 p.

A 5% Cr air hardening steel appears to be the best presently available for either ultra-high strength applications at room or low temperatures, or for elevated temperature stability to 1000° F. In the 220-300,000-psi. tensile range, this steel provides significantly higher impact strength and ductility than low-alloy steels, and 20 to 35% higher fatigue strength than any air melted material previously reported. From 400 to 1000° F., its strength-to-weight ratio surpasses all materials, including heat treated Ti alloys. (Q-general; AY, SGA-h)

831-Q. Research and Development on Investigation of Galling and Friction Characteristics of Metallic Materials and Surface Treated Materials. E. W. Gaylord. Carnegie Institute of Technology. *U. S. Office of Technical Services,* PB 131347, July 1956, 63 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.75.

Tests of rubbing and friction characteristics disclosed that when Ti surfaces are to rub on Ti surfaces, both should be coated. When Ti surfaces are rubbed on other metals, only the Ti need be coated, if the other surfaces are not easily scratched or galled. (Q9p; Ti)

832-Q. Test Methods for Magnesium Surface Treatments. F. W. Pfohl and H. T. Francis. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131600, Nov. 1957, 62 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.75.

New method based on measurement of paint adherence after exposure to a corrosive environment. The technique involved the "gauze-peel test", in which a gauze strip is embedded in the organic coating. After exposure to accelerated corrosion, the gauze is peeled from the surface. Both quantitative evaluations (peel strength) and qualitative (visual examination of the stripped area) can be easily made.
(Q10c, L-general; Mg)

833-Q. The Determination of the Effect of Heat Treatment on the Elevated Temperature Stress-Stability of Titanium Alloys. G. A. Lenning, M. L. Greenlee, W. M. Parris and H. D. Kessler. Titanium Metals Corp. of America. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131724, Feb. 1958, 87 p. (Available from U. S. Office of Technical Services, Washingtor 25, D. C.) $2.25.

Determination of the effects of heat treatment on the stress stability or notch stability of three Ti alloys representative of the alpha-beta type. Ti-140A (2Fe-2Cr-2Mo), Ti-155A (5Al-1.5 Fe-1.5CR-1.5Mo), and Ti-6Al-4V. Duplex solution and age-type heat treatments were shown to provide improvement in strength and creep resistance of the alloys without loss of either stress stability or notch ductility.
(Q23, Q27a, Q3m, 2-64; Ti-b)

834-Q. Development of Improved Titanium Alloys for Application at Elevated Temperatures. B. S. Lement. Manufacturing Laboratories, Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131749, Mar. 1958, 73 p.

(Available from Office of Technical Services, Washington 25, D. C.) $2.

Aluminum improves high-temperature strength of titanium, but higher than 6% the alloys may be brittle at room temperature. Nature of this embrittlement studied in binary alloys containing 6 to 12% Al. Changes in bend ductility, hardness, precision length, electrical resistance, lattice parameters and microstructure which occur on solutionizing and aging.
(Q-general, 2-62; Ti-b)

835-Q.* (French.) **Microhardness Testing Reveals Stress Undergone by Copper and Copper Alloy Parts.** Pierre-Julien Le Thomas. *Fonderie,* no. 148, May 1958, p. 201-210.

Case histories of eight types of test pieces and parts subjected to various types of fatigue testing or broken in actual service. Influence of temperature, load, work conditions, chemical composition and other factors. 3 ref. (Q29q, Q7; Cu)

836-Q.* (German.) **Twin Formation in Zinc Monocrystals.** Rolf Siems and Peter Haasen. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 213-219.

Mechanism of twinning. Loading was increased step-by-step until twins occurred and the twinning was studied by means of microscopy and micro-cinematography. The role of local stress in twin formation was investigated. (Q24b; Zn)

837-Q. (Japanese.) **High-Strength Stainless Steels.** K. Toda. *Metals,* v. 28, June 1958, p. 401-408.

Review of recently developed steels such as 17-7 PH possessing high strength in addition to corrosion resistance. Mechanical properties, composition, structure and method of hardening.
(Q-general, J-general, M27; SS)

838-Q.* **Production and Properties of Aluminum Alloyed Cast Cupro-Nickel.** G. L. Lee. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 570-577.

Two copper-12% nickel alloys developed for marine fittings exhibit high strength and ductility, excellent corrosion resistance. 5 ref.
(Q-general; Cu-b, Ni-b, Al-b)

839-Q.* (French.) **Brittleness of Tantalum in Presence of Hydrogen at Atmospheric Temperatures.** Auguste Clauss and Hubert Forestier. *Comptes Rendus,* v. 246, June 9, 1958, p. 3241-3243.

When traces of dissolved oxygen are present in lattice, Ta reveals abnormal brittleness during deformation in presence of H; decrease of tensile strength varies with speed of application of load. If load in excess of break load of Ta wire in presence of H is applied to wire in vacuum, subsequent admission of H does not cause rupture. Study of modulus of torsion reveals that H does not affect domain of elastic deformations. (Q26s, 2-66; Ta, H)

840-Q. (French.) **Cast Tensile Test Bars for Nonferrous Sand-Cast Alloys.** Dominique Arnaud and Andre Lefebvre. *Fonderie,* no. 145, Feb. 1958, p. 64-74.

At present, only machined tensile test bars are accepted in France for testing of nonferrous foundry products. Study was undertaken to show economies of time and money made possible by use of unmachined bars. As-cast as well as machined bars of eight Al alloys and two bronzes made with new metals (U-E8 and U-E10) were tested. Method of fabrication of bars. 13 ref. (Q27, S22; Al-f, Cu-s, 5-60)

841-Q.* (French.) **New Rheological Creep Model.** C. Crussard. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 375-382.

Proposed model has viscous "centers of creep" which interact elastically on each other. Application of force to one of these centers causes appearance of a transient order and a stationary regime. Calculations show that transient regime is represented by sum of exponential terms, for which observed parabolic laws provide a very close approximation. 11 ref. (Q3, U10e)

842-Q.* (Japanese.) **Hot Workability of Low Carbon Steel.** T. Akutagawa, Y. Michima, E. Asano and A. Suseki. *Engineering Research Institute of Tokyo University, Annual Report,* v. 6, Mar. 1958, p. 49-54.

Influence of Cu and Sn in carbon steel (0.08-0.20% C.) on the hot workability of special shaped steel. Three methods used for the test: hot bending test; hot rolling test; microstructure test. It was concluded that Cu and Sn in steel were concentrated at or near the surface through oxidation reaction; this be-

comes one of the chief reasons for surface cracks.
(Q23, Q4, M27; CN, Cu, Sn)

843-Q. Change of Strain Hardening Coefficient Accompanying Austenite-Martensite Transformation During Plastic Deformation. M. G. Gaidulov and V. D. Sadovskii. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 4-8. (Henry Brutcher, Altadena, Calif., translation no. 4214.)

Result of investigating the increased tensile strength of austenitic steels in which plastic deformation is attended by transformation from austenite to martensite. The character of the change in the stress coefficient is directly bound to the resistance of austenite-to-martensite transformation. Development of martensite during plastic deformation results in higher stress coefficient. There is a mutual bond between plastic flow and martensitic transformation. 14 ref.
(Q25, Q27a, N8p; SS)

844-Q.* Regularities in Creep and Hot-Fatigue Data. A. Graham and K. F. A. Walles. *Aeronautical Research Council,* C.P. no. 379, 1958, 25 p.

A theory is advanced to analyze data in the creep-rupture and hot fatigue data of engineering materials. The theory enables data for different times and temperatures to be classed together, thereby providing information over a much greater temperature range. An underlying numerical pattern common to all the widely different group VIII materials considered shows through the experimental scatter. 6 ref. (Q3, Q7)

845-Q.* Fatigue Properties of Two Aluminum Die-Casting Alloys. G. W. Stickley and J. L. Miller. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 292-299.

Results of reversed bending and axial-stress fatigue tests of 218 and 380 Al die-casting alloys at room temperature, and of reversed bending tests at temperatures up to 500° F. 6 ref. (Q7, Al-b)

846-Q. Comparison of Properties of Liquid and Air-Quenched Pearlitic Malleable Irons. Pt. 2. Duplex, Cold-Melt Process and Alloyed Pearlitic Malleable Irons. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 304-313.

Hardening by liquid quenching, and then drawing (tempering) shown to be a successful means for producing the ASTM 60003 and 80002 grades in all foundries. Air quenching and drawing (tempering) is successfully used to produce ASTM 60003 and lower yield strength grades such as 53004, 48004 and 45007. (Q-general; CI-s)

847-Q. Effects of Geometry on the Properties of Gun-Metal (88-8-4) Castings. W. H. Johnson. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 314-318.

The gun-metal castings exhibited pronounced edge-to-center effects, with the mechanical properties varying from values higher than for the test bars to values considerably lower. Vacuum degassing did not always improve the mechanical properties, and in some cases it had a deleterious effect.
(Q-general, E25s 3-73; Cu-s)

848-Q. Some Observations on Galvanizing Embrittlement of Malleable Iron. R. W. Sandelin. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 409-418.

The galvanizing embrittlement of malleable iron is directly related to its chemical composition, namely, the phosphorus and silicon content. A pretreatment consisting of heating to 1200° F., followed by water quenching, before galvanizing, will eliminate the possibility of embrittlement. 6 ref. (Q26s, L16; CI-s)

849-Q. Effect of Carbon and Manganese on Properties of Constructional Steels for Dynamic Loading Applications. R. D. Engquist. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 419-423.

(Q25; ST, C, Mn, 2-60)

850-Q.* Fracture Characteristics of Copper-Base Alloys. N. C. Howells and E. A. Lange. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 462-468.

Fracture characteristics of 15 Navy Cu-base alloys. Interrelationships between Charpy V energy, tensile elongation and notch ductility for these alloys. (Q26; Cu-s)

851-Q.* The Effect of Cold Work on the Irradiation Stability of Beta Heat Treated Uranium. W. R. Thomas. *Atomic Energy of Canada Ltd.,* CRMET-766, 24 p.

Effect of cold work on the irradiation stability of beta heat

treated uranium has been measured for amounts of cold work varying from 0.70 to 5.8%. Cold work was introduced into full length NRX rods by cold drawing through a circular die. It was found that the surface finish of the rods after drawing was excellent and that the rate of irradiation growth as a function of cold work can be expressed by an equation. 8 ref.
(Q-general, P10d, 2-67, 3-68; U, 2-64)

852-Q.* Properties Affecting Suitability of 9 Per Cent Nickel Steel for Low-Temperature Service. T. N. Armstrong, J. H. Gross and R. E. Brien. Digest from "ASME-AWS Joint Metals Engineering Conference, Paper 58-MET-3". *Mechanical Engineering,* v. 80, July 1958, p. 81.

Charpy values for both keyhole and V-notch specimens are reported for test temperatures down to −320° F. and results for drop-weight tests on ½ and 1 in. plate at −320° F. Welding procedures using both the metal-arc process with covered electrodes and the inert-gas metal-arc process; test values for welds made by each process. Fatigue properties and comparison of plastic fatigue strength with that of several other pressure vessel steels.
(Q-general, 2-63; ST, Ni)

853-Q.* Design Values for Thermal Stress in Ductile Materials. B. F. Langer. Digest from "ASME-AWS Joint Metals Engineering Conference, Paper 58-MET-1". *Mechanical Engineering,* v. 80, July 1958, p. 81.

Methods proposed for application of strain-cycling data to practical design problems involving thermal stress. Multi-axial stress conditions; combined steady and alternating stress; cumulative damage. When the calculated thermal stress exceeds the yield stress of a ductile material, some of the commonly used concepts, such as the Soderberg diagram, must be modified.
(Q25p, 17-51)

854-Q.* Pressure Equipment for Low-Temperature Service. C. K. Soderberg. Digest from "ASME-AWS Joint Metals Engineering Conference, Paper 58-MET-9". *Mechanical Engineering,* v. 80, July 1958, p. 82.

Four most common test categories —stress level in path of advancing crack, fracture appearance, ductibility and impact energy. Materials and fabrication. An approach for the avoidance of brittle failure is suggested. (Q26s, T26q, 2-63)

855-Q.* Factors Affecting Residual Stress in Electrodeposited Metals. Pt. 4. Joseph B. Kushner. *Metal Finishing,* v. 56, July 1958, p. 52-55, 59.

An equation has been proposed giving the relationship of residual stress with thickness of deposit. There appears to be no relation between the known effect of anions on overvoltage and the residual stress in Ni deposits which apparently invalidates the excess energy type theories. 63 ref. (Q25h, 8-62; Ni)

856-Q.* Temperature Dependence of Internal Friction in Germanium. P. D. Southgate. *Physical Review,* v. 110, May 15, 1958, p. 855-857.

The internal friction of Ge measured as a function of temperature at 100 kc/sec. There is a peak at 420° C. and little further rise to within a few degrees of the melting point. A specimen strained in tension shows a rapid rise with temperature above 500° C. Results compared with those of Kessler and it is suggested that the high-temperature rise found in all his specimens is due to thermal stressing. A small peak at 770° C. is attributed to the presence of oxygen in the Ge.
(Q22, 2-61; Ge)

857-Q.* The Effect of Neutron Irradiation on the Impact Properties of En2 Mild Steel. I. L. Mogford, A. T. Churchman and D. Hull. *United Kingdom Atomic Energy Authority,* AERE M/R 2485, Feb. 1958, 10 p.

The impact properties of En2 mild steel have been measured after irradiation with neutrons to a maximum integrated dose of 9.3×10^{19} neutron cm^{-2}. The increase in the transition temperature is approximately proportional to the cube root of the dose. At the maximum dose the rise in transition temperature is 75° C. There is a reduction in the energy absorbed in ductile fracture after irradiation which is approximately 50% for specimens given high doses. 16 ref. (Q6n; Cn, 2-67)

858-Q.* A Theory for Preheating of Plain, Low-Carbon Steels. E. Paul Degarmo. *Welding Journal,* v. 37, Mar. 1958, p. 93s-96s.

Six possible effects of preheating —reduced microhardness, increased width of the heat affected zone, reduced shrinkage stresses, changed hydrogen content, more favorable microstructure and reduced microcracking—are considered. From a consideration of the requirements

for microcracking, retained austenite and hydrogen, a theory is developed which states that it is the elemination of retained austenite at low temperatures, due to the greatly reduced cooling rate below 400° F., which results from preheating, that accounts for the beneficial results obtained. 8 ref.
(Q25, Q29q, P10d, M27, F21; AY)

859-Q.* Evaluation of the Kinzel Test From Its Fracture Characteristics. R. D. Stout, W. J. Murphy and R. C. Westgren. *Welding Journal*, v. 37, Mar. 1958, p. 107s-113s.

The Kinzel test showed welding raises the ductility transition of steel by producing a trigger for cleavage-crack initiation in the vicinity of the weld. In the carbon steels tested, the coarse-grained region was usually the source of the cleavage crack; while in low alloy steel, initiation more commonly occurred in the intercritical zone. Preheating and the heat-input level were not effective in changing the transition temperature, but postheating restored much of the notch toughness lost by welding. The Kinzel test proved sensitive to the loading level at the instant of cleavage initiation. 3 ref.
(Q23p, K9r; ST)

860-Q.* Controlled Low-Temperature Hot Rolling as Practiced in Europe. R. W. Vanderbeck. *Welding Journal*, v. 37, Mar. 1958, p. 114s-116s.

Technique used by various mills in Europe which increased notch toughness in hot rolled products. Average improvement in the 15 ft-lb. V-notch Charpy transition temperature of 20 to 45° F. is possible.
(Q6, F23)

861-Q.* Fatigue Characteristics of Single-Lap Joints of AISI 347 Brazed With a Ni-Cr-Si-B-C Alloy. R. G. Aspden and W. Feduska. *Welding Journal*, v. 37, Mar. 1958, p. 125s-128s.

Brazed specimen exhibited a fatigue endurance limit equivalent to the original annealed AISI 347 strip at room temperature, and 10% lower than the unbrazed material at 1100° F. Fatigue endurance limit of the strip tested to be 50 x 10^6 cycles with 31,600 psi. at room temperature and 31,000 psi. at 1100° F. Fatigue cracking of brazed strip occurred adjacent to the joint, rather than through the joint interface. 12 ref.
(Q7; SS, *N, Cr, Si*, B, C, 7-52)

862-Q. A Creep Machine Under High Vacuum and for Low Stresses. A. Gautier. *Revue de Metallurgie*, v. 55, Jan. 1958, p. 9-16. (Iron and Steel Institute, Translation no. 919.)

Previously abstracted from original. See item 361-Q, 1958. (Q3, 1-53)

863-Q. The Classification of Steel Structures From the Point of View of the Danger of Brittle Fracture. K. Ruhl. *Schweissen und Schneiden*, v. 10, Feb. 1958, p. 39-44. (Iron and Steel Institute, Translation no. 1020.)

Previously abstracted from original. See item 342-Q, 1958.
(Q26s, Q23r; ST, SGA-s)

864-Q.* (Czech.) Strength of Bonded Light Metal Joints in Fatigue Testing. Vladimir Gregor. *Zvaranie*, v. 7, May 1958, p. 135-141.

Results of fatigue strength tests made on single and double overlapping epoxy bonded joints, using thin sheets of Al-Mg-Cu alloys. Compares strength of adhesive bonds to riveted or spot-welded joints.
(Q7a; Al, Cu, Mg, 7-58)

865-Q. (French.) Fatigue Failure. Investigation of Damaged Parts of Vibrator Units. *Soudage et Techniques Connexes*, v. 12, May-June 1958, p. 184-186.

Parts operate at a rate of over 10,000 strokes per min. Cracks were found at the junction between a 0.5% C steel tube and a 3% Ni steel semispherical tip, the weld being made on a backing ring. Failures result from very strong vibration sustained by the unit and defective welding. (Q7, 9-72; ST, 7-51)

866-Q.* (German.) Behavior of Light Metal Alloys at Elevated Temperatures. W. Jung-Konig and U. Zwicker. *Aluminium*, v. 34, June 1958, p. 337-345.

Uses published information and experimental data as basis for comparison of high-temperature properties of Al, Mg, and Ti alloys. Ti alloys $TiAl_6B_4$, $TiAl_7Mo_3$ selected as superior to other light alloys at temperatures up to 450 and 500° C. respectively. Above 250° C., sintered Al powder had higher strength than other Al and Mg alloys. 30 ref.
(Q-general, 2-63; Al-b, Mg-b, Ti-f)

867-Q. (Japanese.) Distribution of Pressed Surface Profiles. Pt. 4. Contact Between Rough Surfaces. Akira Iwaki and Masaki Mori. *Japan Society of Mechanical Engineers, Transactions*, v. 24, Feb. 1958, p. 83-88.

Presents transformation law of distribution of roughness pressed on

mirror surface. Investigates change of roughness in case of contact between two rough surfaces by comparing distribution curves of roughness pressed on mirror surfaces corresponding to roughness of pressing surface. Gap and contact ratio can be presumed by calculating both distribution functions of roughness. (Q9)

868-Q.* (Italian.) **Dependence of Elastic and Anelastic Parameters on Concentration in Antimony-Bismuth Alloys.** Kamal Matta and Italo Barducci. *Ricerca Scientifica,* v. 28, Mar. 1958, p. 533-540.

Electro-accoustical method was used to determine modulus of longitudinal elasticity, modulus of torsion, speed of propagation of elastic waves, coefficient of contraction and logarithmic decrement of oscillations. Comparison of results with those of similar study of Ag-Au alloys permits general conclusions regarding behavior of binary alloys characterized by complete miscibility in the solid state in all proportions. 4 ref. (Q21, Q22, 2-60; Sb, Bi)

869-Q.* (Russian.) **Mechanism of Brittle Failure in Steel.** B. S. Kasatkin. *Svarochone Proizvodstvo,* June 1958, p. 24-28.

Brittle failure is a two-stage process. The first stage is breaking down of the grains accompanied by plastic deformation and the formation of internal microcracks. In the second stage cracks develop on the thin surface layers, extending to the bottom of the break, and spreading crosswise to the partially deformed grains. 8 ref. (Q26s; ST)

870-Q.* (French.) **Mechanical Properties of the Isothermal Decomposition Products of Austenite in Three Construction Steels.** R. Potaszkin and K. Bar-Avi. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 345-363.

Specimens of SAE 3140, 4140 and 1340 steels were studied in tempered as well as untempered state after transformation. In all cases, lower bainite was found to have mechanical properties comparable to those obtained by quench and temper; untempered upper bainite revealed low values for yield strength, reduction of area and impact strength. 6 ref. (Q-general, N8g, N8m; ST)

871-Q.* **An Investigation of Plastic Stress-Strain Relationships Using Grooved Tensile Specimens.** J. P. Ellington. *Journal of the Mechanics and Physics of Solids,* v. 6, July 1958, p. 276-281.

Determination of plastic potential of thoroughly annealed brass and copper. The brass was found to have a Mises potential (the strain-rate being proportional to the deviatoric stress); copper showed a deviation from this potential, presumably due to anisotropy. (Q25n; Cu, Cu-n)

872-Q.* **Fracture Mechanism of Semi-Brittle Steels in Torsion.** J. B. Hunt. *Journal of the Mechanics and Physics of Solids,* v. 6, July 1958, p. 321-326.

The petal-shaped pattern noticed on the fracture surface of certain mild steels tested in torsion led to investigation of the mechanism of a type of fracture hitherto assumed to be a conventional shear separation. It was found that the fracture sequence involved both tensile failure and sliding in shear. (Q26, Q1a; ST)

873-Q.* (English.) **Study of the Behavior at High Temperatures of Nodular Cast Irons Alloyed With Silicon.** T. Dumitrescu, Maria Nicolaid and Pamfil Iliescu. *Revue de Métallurgie, (Bucarest),* v. 1, 1956, p. 33-53.

Nodular cast irons alloyed with Si, especially those with a Si content of 4.5-6%, are superior to Al cast irons and many oxidation resistant cast irons as regards mechanical properties, dimensional stability at high temperatures and resistance to oxidation. 8 ref. (Q-general, 2-60; CI-r, *Si*)

874-Q. **Set-Resistance of Spring Steel Strips at Room Temperature.** V. Ya. Zubov and S. V. Grachev. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 20-23. (Henry Brutcher, Altadena, Calif., Translation no. 4218.)

Setting characteristics of spring steel strips bent into rings of different types. Silicon steel alloyed with W and Mo (EI 722) has considerably greater resistance to relaxation than steels EI 142 and V 10 A with lower Si content. Three different kinds of hardened unannealed steel showed lower resistance to setting. Evidently this was due to the decomposition of martensite under prolonged active tension. 6 ref. (Q3, Q21; ST, SGA-b)

875-Q. (French.) **Fatigue Strength of Some Machine Components and De-**

tailed Study of Scatter of Results. Luigi Locati. *Revue de Métallurgie,* v. 55, Apr. 1958, p. 364-374.
6 ref. (Q7a, S12, T7)

876-Q.* (French.) Study of Hot Plastic Deformation of a Soft Iron and a Stable Nickel-Chromium Austenite. R. Tamhankar, J. Plateau and C. Crussard. *Revue de Métallurgie,* v. 55, Apr. 1958, p. 383-400.

Mechanical properties and structural modifications accompanying deformation at high temperature studied by tension, torsion, creep and internal friction tests. Portevin-le Chatelier phenomenon resulting from segregations produced during course of tests and its influence on mechanical properties. General equation for creep based on deformation, load, temperature and time factors. Heats of activation of creep over a wide range of temperature. Slip and intercrystalline decohesion become preponderant above equicohesive temperature. Role of intercrystalline slip, slip and diffusion at grain boundaries, polygonization and recrystallization. 10 ref.
(Q24, Q3; Fe, SS-e)

877-Q. (German.) **Theory of Transient Creep in Metal Crystals.** Hubert Blank. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 301-308.

Attempt to deduce the formulas for transient creep from a displacement model. A certain relation exists between the model and the hardening properties of cubic face-centered crystals. Creep occurs in dependence of a parameter and resulting in parabolic, hyperbolic or logarithmic velocity laws. Starting conditions for creep are developed mathematically. At higher temperatures elastic influences produce superhyperbolic curvature. 21 ref.
(Q3)

878-Q* (German.) **Testing Sheet Metals With the Cup Drawing Test.** Alfred Krisch, Karl-Heinz Muhr and Wilhelm Schluter. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 313-320.

Attempt to evaulate the cup test for determination of drawing properties of sheet metals. Various steels were tested but did not provide sufficiently clear results to differentiate between their properties. Tables and diagrams on thickness, drawing forces, chemical composition. 13 ref. (Q23q, 1-54; ST, 4-53)

879-Q. (German.) **Comparison of Characteristics of Structural Alloy Steels After Heat Treatment and Intermediate Heat Treatment.** Jercy Tymowski. *Bergakademie,* Mar. 1958, p. 209-212.
(Q-general, 2-64; ST)

880-Q. (German.) **Influence of Alloying Elements on Retention of Hardness.** Milos Pridal. *Bergakademie,* Mar. 1958, p. 212-213.
(Q29n, 2-60; AD-n)

881-Q. (German.) **Studies of Internal Strain of Fatigue.** Miroslav Holy. *Czechoslovak Journal of Physics,* v. 8, 1958, p. 108-111.
(Q7)

882-Q. (German.) **Characteristics of Some Steels for High-Temperature Service.** Albert von den Steinen. *Energie,* May 1958, p. 194-198.
(Q-general, 2-62; ST)

883-Q. (German.) **Determination of Damping Capacity.** A. Troost. *Industrie-Anzeiger,* May 2, 1958, p. 21-23.
12 ref. (Q8g)

884-Q.* (German.) **Changes in Material Properties After Exposure to Radiation.** K. Sagel. *Metall,* v. 12, May 1958, p. 353-362.

Basic effects and some of the changes in metallic, nonmetallic and organic substances. The changes in metals are mainly effected by radiation causing the so-called Frenkel defects, thus enhancing the hardness of crystals and the diffusion properties. 35 ref.
(Q26s, Q29n, N1, 2-67)

885-Q.* (German.) **Fatigue Properties of the Alloy $TiAl_6V_4$.** U. Zwicker. *Metall,* v. 12, May 1958, p. 381-386.

Various Ti alloy specimens were subjected to essentially the same heat treatment (2 hr. at 700° C., air cooled) and the same load (22 kg. per sq. mm. and 14 kg. per sq. mm.) at 450° C. for 1000 hr. Creep velocity, elongation and hardness were recorded. Effects studied were: type of Ti sponge used, chemical composition, (particularly V and Al contents) texture, heat treatment, hydrogen content. 16 ref.
(Q-general, 2-60, 2-64; Ti, *Al, V*)

886-Q. (German.) **Influence of Inherent Tension on Buckling of Steel Bearings.** B. Thuerlimann. *Schweizer Archiv,* Dec. 1957, p. 388-404.
16 ref. (Q28g, T7a; ST)

887-Q. (German.) **Notch Impact Strength of Nickel.** P. Kuhn. *Schweizer Archiv,* Feb. 1958, p. 59-62.
3 ref. (Q6n; Ni)

888-Q. (German.) **Properties and Fundamentals of the Production of**

Nodular Cast Iron. W. Patterson. *VDI-Berichte,* v. 27, 1958. p. 7-10.
(Q-general, E-general; CI-r)

889-Q. (German.) **Influence of Temperature on Impact Tension of Nodular Cast Iron.** A. B. Everest. *VDI-Berichte,* v. 27, 1958, p. 19-22.
8 ref. (Q6n, 2-61; CI-r)

890-Q. (German.) **Electronic Theory of Mechanical Strength.** G. M. Schwab, J. Tsipuris and M. Tsipuris. *Zeitschrift für Physikalische Chemie,* v. 14, Jan. 1958, p. 66-75.
(Q-general, M25)

891-Q. (Japanese.) **High-Strength Copper Alloys; Four High-Strength Copper Alloys Containing Titanium.** Y. Mishima and S. Morikawa. *Engineering Research Institute in Tokyo University, Annual Report,* v. 16, Mar. 1958, p. 101-105.
Mechanical tests including abrasion in contact with rotating metallic drum, as well as spring limit measurement carried out on Cu-Ti-Be and Cu-Ti-Ag alloys.
(Q-general, Cu-b, *Ti,* SGB-a)

892-Q. (Japanese.) **Distribution of Deformation Profiles on Contact of Rough Surfaces.** Akira Iwaki and Masaki Mori. *Japan Society of Mechanical Engineers, Transactions,* v. 24, Feb. 1958, p. 83-93.
Law of distribution of roughness to mirror surface developed; coefficient of changing roughness given.
11 ref. (Q9, S15)

893-Q.* (Spanish.) **Welding Stresses in Ship Hulls and Welded Structures.** A. Audige. *Ciencia y Tecnica de la Soldadura,* v. 8, Mar-Apr. 1958, 8 p.
Residual stresses can contribute to crack initiation and or propagation in presence of any kind of "notch" in weld, but are generally not harmful of and by themselves. Suggestions for reducing influence of these stresses. 16 ref.
(Q25h, T22g, 7-51)

894-Q.* **Temper Embrittlement in Nodular Cast Irons.** G. N. J. Gilbert. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 49-65.
Ferritic nodular cast irons and malleable cast irons of appropriate composition, which have previously been slowly cooled from about 1202° F., are embrittled when quenched from about 842° F. By embrittlement is meant the raising of the transition temperature. Irons similarly treated but slow cooled from 842° F. instead of quenched have their ductility progressively increased during the slow cooling cycle. 13 ref. (Q23r, Q26s; CI-r)

895-Q. Determination of Stress-Strain Properties at High Rates of Strain. R. J. MacDonald, R. L. Carlson and W. T. Lankford. *Engineering Sciences, Technical Paper,* v. 4, no. 1, 1957, p. 163-170.
11 ref. (Q25n, Q22; ST)

896-Q. Wear Resistance of Some Nickel-Base Alloys. R. A. Kozlik. *Foundry Trade Journal,* v. 104, June 12, 1958, p. 717-718.
(Q9; Ni-b)

897-Q. Raising the Physicals of 6063 Alloy Extrusion Billet. James K. McLaughlin. *Modern Metals,* v. 14, July 1958, p. 56, 58, 60, 62.
Research reveals partial homogenization achieved with induction heating.
(Q29, Q28g, 2-64; Al-b, 4-58)

898-Q. The Behavior of Heat Resisting Steels During Creep Testing at 500-700° C. Group 2. Experimental Equipment and Technique of Long-Time Creep Testing. K. G. Olsson. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 679-685. (Iron and Steel Institute, Translation no. 340.)
Previously abstracted from original. See item 407-Q, 1958.
(Q3; SS, 1-53)

899-Q. The Behavior of Heat Resisting Steels During Creep Testing at 500-700°. C. Group 5. Scatter of Results of Long-Time Creep Tests. Wilhelm Schluter. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 717-730. (Iron and Steel Institute, Translation no. 843.)
Previously abstracted from original. See item 412-Q, 1958.
(Q3, 1-54; SS)

900-Q. Machine for the Study of Creep in a Higher Vacuum and With Low Constraint. A. Gautier. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 9-16. (Iron and Steel Institute, Translation no. 919.)
Previously abstracted from original. See item 361-Q, 1958. (Q3, 1-53)

901-Q. (English.) **Mechanism of Friction Between Metal Surfaces. Pt. 2. The Fine Mechanism of Static Friction.** Gennosuke Yoshimoto and Tadasu Tsukizoe. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 19-22.
(Q9p)

902-Q. (English.) **Creep of Low Carbon Steel Under Fluctuating Stresses.** Toshio Nishihara, Shuji Taira, Kichino-

suke Tanaka and Kiyotsugu Ohji. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 31-34.
(Q3, CN-g)

903-Q. (English.) **Theoretical Study of Effect of Pressing and Stretching on Springback.** Yasuhisa Tozawa. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 49-56.
"Springback" is defined as the distortion caused by the elasticity inherent in the material after work-hardening. (Q22n; ST)

904-Q. (French.) **Study of Strains Set Up in High-Chromium Steels by Quenching.** C. Bovirosa. *Métallurgie et la Construction Mécanique,* v. 90, June 1958, p. 473-481.
Origins and thermomechanical history of high-chromium steels for tools used for cutting magnetic circuit sheets. (Q25p, J26; TS, *Cr*)

905-Q. (German.) **Special Changes of Characteristics in the Alloy Series Co_3V-Ni_3V as a Function of Heat Treatment.** Werner Köster and Franz Sperner. *Bergakademie,* Dec. 1957, p. 614-616.
Electrical resistance; Hall constant; Vickers' hardness; modulus of elasticity.
(Q-general, P15, 2-64; Co, Ni, V)

906-Q. (German.) **Irregular Deformation of Metals.** A. T. Balewsky. *Comtes Rendus de l'Academie Bulgare des Sciences,* no. 6, Nov-Dec. 1957, p. 465-468.
Variation of elastic deformation with stress. 15 ref. (Q21)

907-Q. (German.) **Relative Hardness and Degree of Aging in Assessment of Gray Cast Iron.** Wilhelm Patterson. *Giesserei,* v. 45, July 3, 1958, p. 385-387.
5 ref. (Q29n, N7a; CI-n)

908-Q. (German.) **Strength Characteristics of Test Bars Cast-On and Cut From Casting.** Heinrich Resow and Werner Trommer. *Giesserei,* v. 45, July 3, 1958, p. 387-397.
Sampling from steel castings; location of test bars when casting; mechanical properties of test strips cut from casting. 6 ref.
(Q-general, S12h; ST, 5-60)

909-Q. (German.) **Notch Impact Strength of Steel Mine Supports.** Wilhelm Schaefer. *Glückauf,* no. 5-6, Feb. 1, 1958, p. 176-179.
5 ref. (Q6n; ST)

910-Q. (German.) **Lubrication and Wear.** G. Fleischer. *Machinenbau-Technik,* v. 7, Apr. 1958, p. 229-238.
(Q9, 18-73)

911-Q. (German.) **Flaws in Steel and Their Causes.** *Technik und Betrieb,* v. 10, June 1958, p. 86-88.
Brittleness and its control.
(Q26s; ST)

912-Q. (German.) **High-Temperature Stability of Nodular Cast Iron.** H. Stelzenmüller. *VDI-Berichte,* v. 27, 1958, p. 61-69.
Test in hot drawing of unalloyed nodular cast iron comparable to behavior of unalloyed steels. The hot drawing stability decreases gradually until approximately 425° C., afterwards faster. (Q23q, 2-62; CI-r)

913-Q. (Italian.) **Progress in the Field of Heat Resistant Alloys and Recent Industrial Applications.** *Ingegnere,* v. 32, Apr. 1958, p. 319-321.
(Q-general, 17-57; SGA-h)

914-Q. (Japanese.) **Precipitation Hardened Stainless Steels.** S. Kawahata and Y. Sato. *Metals,* v. 28, June 1958, p. 409-416.
Microstructure and mechanical properties of precipitation hardened stainless steel alloys.
(Q-general, M27; SS)

915-Q. (Japanese.) **Low-Nickel, High-Manganese Stainless Steel.** S. Kinshiki. *Metals,* v. 28, June 1958, p. 417-420.
Mechanical and physical properties of AISI 201, 202, 301 and 302 steels compared.
(Q-general, P-general; SS)

916-Q. (Japanese.) **Characteristics of Vacuum Melted Stainless Steel.** S. Yamamoto and Y. Hatsuk. *Metals,* v. 28, June 1958, p. 421-423.
Mechanical and physical properties of AISI 304, AISI 316L and AISI 347 steels compared.
(Q-general, P-general, D-general, 1-73; SS)

917-Q. (Russian.) **Effect of Mechanical and Heat Treatment on Mechanical Properties of Metal Surfaces.** B. M. Rovinskii and V. I. Mokeeva. *Fizika Metallov i Metallovedenie,* v. 5, no. 2, 1957, p. 331-339.
9 ref. (Q-general, 264, 3-68)

918-Q. (Russian.) **Wear Resistance of Magnesium Cast Iron.** A. D. Ushakov. *Liteinoe Proizvodstvo,* May 1958, p. 17-18.
Magnesium iron with spheroidal graphite structure possesses great strength and exceptional wear resistance and can be substituted for nonferrous alloys for friction resistance purposes. (Q9p; CI-r)

919-Q. (Russian.) **Effect of Welding Thermal Cycle on Mechanical Properties of Low-Alloy Steels in Zone Adjacent to Weld.** G. N. Klebanov. *Svarochnoe Proizvodstvo,* May 1958, p. 5-8.

(Q-general, 2-61; AY, 7-51)

920-Q. (Russian.) **Determination of Degree of Plastic Deformation of Cut Metal.** A. M. Rozenberg and G. L. Kufarev. *Vestnik Mashinostroeniya,* v. 38, June 1958, p. 49-52.

7 ref. (Q24, G17)

921-Q. (Russian.) **Dynamic Method for Measuring Relationship of Modulus of Elasticity to Temperature of Iron, Using Specially Constructed High-Vacuum Device.** R. I. Garber and A. I. Kovalev. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 477-479.

6 ref. (Q21a, 1-54, 2-61; Fe)

922-Q. (Russian.) **Device for Bending Secured Objects to Test Endurance Limit of Metals.** B. A. Avdeev. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 508-510.

(Q7g, 1-53)

923-Q. (Russian.) **Mechanical Device for Measurement of Degree of Plastic Deformation of Steel.** E. G. Dolmatov and I. I. Sitnikov. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 629-631.

4 ref. (Q24, 1-54; ST)

924-Q.* **Report on the Properties of Titanium Alloys at Elevated Temperatures.** F. R. Schwartzberg, F. C. Holden, H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute, Titanium Metallurgical Laboratory, TML Report no. 82, Sept. 10, 1957, 216 p.

Detailed analysis of short-time elevated-temperature properties, elevated-temperature creep and rupture properties; thermal stability.
(Q3; 2-62, Ti-b)

925-Q.* (French.) **Several Effects of Chemical Composition on the Mechanical Properties of Steel.** G. Mayer and L. H. Toft. *Revue du Nickel,* v. 24, Apr-May-June 1958, p. 27-38.

Variations in chemical composition did not have much effect on tensile properties. Additions of Ni, Mo and V improved the impact properties, while Cr and Mn had an unfavorable effect. Effects were more pronounced in bainitic than martensitic structures. 5 ref. (Q27, Q6; AY, Ni)

926-Q.* (Russian.) **Fatigue Strength of Large Section Element Electro-Slag Welds.** I. V. Kudryavtsev, N. E. Naumchenkov and N. M. Savvina. *Svarochnoe Proizvodstvo,* Apr. 1958, p. 15-19.

Investigation of metallurgical and mechanical properties of electro-slag welds leads to following conclusions: welds of mild steel subjected to mechanical working have high endurance limit; the endurance limit of welds not subjected to thermal treatment is only slightly lower than that of base metal. Investigation discloses effect of size on fatigue strength. Endurance limit of cylindrical steel elements with 150 to 200 mm. diameter is 25% lower than that of objects with 20 mm. diameter. 5 ref.
(Q7a, 2-64, 2-68; ST, 4-60, 7-51)

927-Q.* **Compressive Strength and Creep of 17-7 pH Stainless-Steel Plates at Elevated Temperatures.** Bland A. Stein. *National Advisory Committee for Aeronautics, Technical Note 4296,* July 1958, 36 p.

Compressive strength test results from room temperature to 1000° F. and compressive creep test results from 700 to 1000° F. for plates of 17-7 pH stainless steel, condition TH 1.050. 8 ref. (Q28g, SS; 2-62)

928-Q. **Tentative Proposal for the Origin of Internal Friction Peak Observed in Cold Worked Iron.** Noboru Okazaki. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 67-70.

Peak may be originated in the behavior of face-centered-cubic structure. 23 ref. (Q22, M26c; Fe)

929-Q. **Relaxation Phenomena on the Double Transition in Charpy Test.** Noboru Okazaki. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 71-77.

Upper and lower transition may be associated with the critical temperature of FCC→BCC and BCC→FCC structural changes, respectively, at the stress state. 27 ref.
(Q6, N4; ST)

930-Q. **On the Local Distribution of Strain in Plastically Deformed Aluminum Crystals. Pt. 3.** Zenji Nishiyama and Satohiro Hayami. *Institute of Scientific and Industrial Research, Osaka University, Memoirs,* v. 15, 1958, p. 129-143.

5 ref. (Q24; 14-61, Al)

931-Q. **Effect of Fatigue Crack on Static Strength: 2014-T6, 2024-T4, 6061-T6, 7075-T6 Open-Hole Monobloc Specimens.** G. E. Nordmark and I. D. Eaton. *National Advisory Committee*

for Aeronautics, Technical Note 1428, May 1957, 22 p.

Static tensile test results are presented for specimens of 2014-T6, 2024-T4, 6061-T6 and 7075-T6 Al alloys containing fatigue cracks. The 6061-T6 alloy specimens were least susceptible to the crack and the 7075-T6 alloy specimens most susceptible. (Q7, Q27a; Al-b)

932-Q. Creep Behavior of Structural Joints of Aircraft Materials Under Constant Loads and Temperatures. L. Mordfin and A. C. Legate. *National Advisory Committee for Aeronautics, Technical Note 3842,* Jan. 1957, 53 p.

Results of 55 creep and creep-rupture tests on structural joints. Methods utilize creep data on the materials of the joint in tension, bearing and shear. (Q3m, T24a)

933-Q. The Fatigue Strength of Aluminum Alloy Lugs. J. Schijve and F. A. Jacobs. *National LuchtLab. Amsterdam Rap. M. 2024,* Jan. 1957, 20 p.

Fatigue diagrams established for unnotched specimens and two types of lugs of 2024-T Al alloy. Different factors which may effect the fatigue behavior of lugs. (Q7a; Al-b)

934-Q. Formation of Fatigue Cracks. W. A. Wood. *Philosophical Magazine,* v. 3, July 1958, p. 692-699.

Contours of the slip bands produced by fatigue straining of metals viewed by a process of taper-sectioning and optical microscopy which permits effective magnifications of some 20,000 times. (Q7g; Cu)

935-Q. (English.) **Theory and Practice in Steel Construction.** Fritz Stussi. *Acier-Stahl-Steel,* no. 2, 1958, p. 84-90.

Mathematical analysis in design of structures; mechanical properties of steel. (Q25, Q7; ST)

936-Q. (French.) **Rough Tensile Tests for Nonferrous Sand Castings.** A. Lefebvre and D. Arnaud. *Fonderie Belge,* v. 28, Apr. 1958, p. 119-122.

(Q27a; Cu-b, 5-60)

937-Q. (German.) **Emcotest—a New Universal Hardness Tester.** Tschirch and F. Gärtner. *Fertigungstechnik,* v. 8, May 1958, p. 225-228.

Tester with spring coupling for direct hardness measuring. (Q29)

938-Q. (German.) **Influence of the Hardening Process on the Durability of Circumference Hardened Gears.** Heinz Glaubitz. *Industrieblatt,* v. 58, June 25, 1958, p. 217-221.

15 ref. (Q9n, T7a; 2-64)

939-Q. (German.) **Rapid Testing of Various Types of Steel.** H. Haberhauer. *Maschinenbau,* Apr. 1958, p. 107-108.

Fracture test, spark test, etch test. (Q26, S10s, M20q)

940-Q. (German.) **Flaking of Steel.** F. Feeg. *Rundschau,* Feb. 1957, p. 470-474.

55 ref. (Q23; ST, 9-70)

941-Q. (Russian.) **Methodology of Determining Crack Sensitivity of Materials.** B. A. Drozdovsky and Ya. B. Friedmann. *Zavodskaya Laboratoriya,* v. 21, 1955, p. 579-590.

Crack sensitivity of a high-strength steel annealed and tempered at 200 or 510°, and heat-treated isothermally in various ways. Determination of the breakdown stress in static bending was made on notched samples, as well as on samples with cracks produced by preceding cyclic impact loading, and other methods. (Q26q; AY, 9-72)

942-Q.* Steel in Prestressed Concrete. W. O. Everling. *Blast Furnace and Steel Plant,* v. 46, July 1958, p. 691-697.

Stress strain curves, relaxation, creep and tensile properties of prestressing wire for prestressed concrete structures. Elastic properties of wire, cold drawn, stress relieved, oil tempered or lead patented. Sensitivity to stress corrosion and fatigue as demonstrated by tests in hot ammonium nitrate solutions. Protection afforded by concrete.
(Q27a, Q23b, T26p, CN-r, 4-61)

943-Q.* Which High Strength Steel? Robert J. Nekervis, C. H. Lund and A. M. Hall. *Materials in Design Engineering,* v. 48, July 1958, p. 84-89.

Advantages and limitations for use in aircraft; tensile strength, yield strength, creep and stress rupture properties of hot work toolsteels, martensitic stainless steels, low alloy steels, precipitation hardenable, semi-austenitic stainless steel and austenitic stainless steel.
(Q27, Q3; SS, TS)

944-Q.* The Fatigue Strength of Specimens Cut From Pre-Loaded Blanks. N. E. Frost. *Metallurgia,* v. 57, June 1958, p. 279-282.

Prior fatigue loading of blanks did not significantly alter fatigue

strength of B.S. L65 Al specimens cut from the body (i.e., remote from pre-surface of material). Static pre-loading, compression or torsion caused an increase in fatigue strength for mild steel. The strength increased literally with amount of pre-strain. Similar pre-loading caused decrease in fatigue strength for alloy. 5 ref.
(Q7, Q23; Al-b)

945-Q.* High-Strength Nonmagnetic Alloys. *Materials in Design Engineering,* v. 48, Aug. 1958, p. 104-106.

Many applications require nonmagnetic alloys with tensile strengths about 200,000 psi. and approximately 5% elongation. The copper and cobalt-base alloys, titanium alloys, and austenitic stainless steels come closest to these values. Magnetic properties of specific alloys are discussed.
(Q-general, P16; Co-b, Cu-b, Ti-b, SS)

946-Q.* Behavior of Certain Alloys Subjected to Dynamic Loading. Ralph G. Crum and F. T. Mavis. *ASTM Bulletin,* no. 231, July 1958, p. 88-91.

A spring-powered impact apparatus and a data recording system for dynamic tension tests of 0.25-in. diameter specimens. Steel, Al and Ti alloys were tested statically and dynamically at constant or slightly increasing velocity from impact to fracture. Yield and ultimate strengths are greater for dynamic loading than for static loading. The ductility of specimens of a given material was essentially the same whether the specimens were loaded statically or dynamically. 6 ref.
(Q6, Q23b, Q23p; Al-b, Ti-b)

947-Q.* The Initiation of Cleavage Fracture at the Intersection of Deformation Twins in Zinc Single Crystals. R. L. Bell and R. W. Cahn. *Institute of Metals, Journal,* v. 86, June 1958, p. 433-438.

Detailed observations demonstrate that the cleavage fracture of single crystals of Zn of a special orientation, tested in tension at room temperature, started at the points of high stress concentration resulting from the meeting of pairs of twin lamellae on the systems (1012) and (1012). 14 ref. (Q26n; Zn, 14-61)

948-Q.* The Development of Microscopic Inhomogeneities of Deformation in Polycrystalline 70:30 Brass: Some Effects of Method of Deformation. L. E. Samuels and M. Hatherly. *Institute of Metals, Journal,* v. 86, June 1958, p. 442-446.

The incidence of two types of microscopic inhomogeneity of deformation (lamellar slip bands and kink bands) in polycrystalline 70-30 brass is found to vary markedly with different methods of unidirectional deformation. The kink-band type of inhomogeneity does not influence strain-hardening, but the slip bands do have a small influence, particularly when the bands develop on multiple systems. This is interpreted as indicating that strain-hardening is due largely to interference between intersecting slip systems. 18 ref. (Q24; Cu-n)

949-Q.* The Effect of Neutron Irradiation on the Mechanical Properties of Copper and Nickel. M. J. Makin. *Institute of Metals, Journal,* v. 86, June 1958, p. 449-455.

The yield stress of both metals is increased by irradiation, and the increase is markedly temperature-dependent, being very much greater at low temperatures than at high. The temperature variation in yield stress after irradiation is a reversible phenomenon and is not due to an annealing effect at the higher temperatures. The rate of work hardening is greatly reduced by irradiation, especially at low strains. The ultimate tensile strength is increased and the elongation to fracture is reduced by irradiation. Results are discussed in terms of the possible mechanism of irradiation-hardening. 9 ref. (Q23, Q27a; Cu, Ni, 2-67)

950-Q.* How to Make Hydraulic Tubing Last Longer. C. S. Yen and J. L. Waisman. *Metal Progress,* v. 74, July 1958, p. 88-92.

Roughness of the tube surface, amount of flattening in a bend and tensile strength are controlling factors. Careful attention to these variables is necessary if the tube system is to endure the changing stresses caused by pressure pulses.
(Q7k; 4-60)

951-Q.* Molybdenum Is Here to Stay. J. L. McCloud. *Metal Progress,* v. 74, Aug. 1958, p. 75-78.

Molybdenum is pre-eminent among metals for high-temperature uses and is solidly entrenched in the electronics industry and for missile parts whose working life is very short. Protective coatings have been perfected so gas turbine blades can run at 2000° F.
(Q-general, 2-62, T24e, T1, 17-57; Mo)

952-Q.* W-545 . . . a Better Turbine Disk Alloy. J. T. Brown. *Metal Progress,* v. 74, Aug. 1958, p. 87-90.

A new iron-base turbine disk alloy having a good combination of high-temperature stress-rupture strength and ductility, and low-temperature tensile strength has been developed. Boron in amounts from 0.005 to 0.15% increases the inherent ductility of the present austenitic precipitation hardening alloys. Further strengthening, by additions of larger amounts of titanium, is then possible without allowing the material to become notch sensitive. (Q-general, T7h, 17-57, 2-62; Fe, SGA-h)

953-Q.* Influence of Hotworking Conditions on High-Temperature Properties of a Heat-Resistant Alloy. John F. Ewing and J. W. Freeman. *National Advisory Committee for Aeronautics Report 1341,* 1957, 52 p.

An alloy containing 20% Cr, 20% Ni, 20% Co, 3% Mo, 2% W and 1% Cb was investigated. Limited isothermal deformations increase strength. Larger reductions either do not increase strength or cause a decrease. Thus, high-production processes, giving large reductions at essentially constant temperature, lead to low or medium strength in the hot worked condition. Working over a falling-temperature range, with finishing temperatures as high as 1800° F. or higher, can give very high strengths at 1200° F., equal to those usually obtained only by hot-cold-work. (Q-general, 2-62; Cr, Ni, Co, Mo, W, Cb, SGA-h)

954-Q. Fracture Types in Germanium and Silicon Crystals. V. P. Mitrenin and B. V. Aleksandriya. Paper from "Growth of Crystals", Consultants Bureau, Inc., 1958, p. 135-138.

Specific shapes of Ge and Si crystal fracture are described from observations made by electron microscopy. The crystals were fractured by moderate blows. Reciprocal lattice X-ray data were used to determine the crystallographic plane orientations. Photomicrographs show the conchoidal fracture in a Ge single crystal with clearly developed steps on the (111) plane. The steps are approximately parallel and almost right-angled fractures occur on them. (Q26; Ge, Si, 14-61)

955-Q. Preliminary Microscopic Studies of Cermets at High Temperatures. E. T. Montgomery, T. S. Shevlin, H. M. Greenhouse and H. W. Newkirk. Ohio State University Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131470, Apr. 1955, 40 p. $1.25.

High-temperature (to 1800° F.) properties of the promising cermet IIIB (55.4 TiC-17.9 TiB_2-10.0 Si-16.7 Co). (Q-general, 2-62; 6-70)

956-Q. Ceramic Reinforced Alloys and Plated Cermets. M. T. Curran. New York State College of Ceramics. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131188, May 1957, 49 p. $1.25.

A precision technique was developed for casting superalloys around ceramic rod reinforcement. Electroplating of cermets with Ni and Cr improves their impact resistance. (Q-general; Cr, Ni, Mo, 6-70, 8-12, 8-69)

957-Q. Lubrication of Titanium. R. O. Lee and N. Fatica, Clevite Research Center. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131650, Dec. 1957, 51 p. $1.50.

Role of oxide films on Ti, the frictional properties of modified Ti coatings, and the comparative wear resistance of the best surface treatment in the presence of various lubricants. Tests showed Halocarbon 11-14 to be the most effective lubricant on treated and untreated surfaces. (Q9n, 18-73, 2-61; Ti)

958-Q. Development of Electroplating Processes to Eliminate Hydrogen Embrittlement in High-Strength Steel. J. E. Chilton. Stanford Research Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131721, Jan. 1958, 84 p. $2.25.

Electrodeposition of Cd on a high-strength, aircraft quality steel. (Q26s, L17; SS, *Cd*)

959-Q. Investigation of the Effects of Incongruous Elements and the Interaction Effects of These Elements on High-Temperature Strength of Fe-Co-Ni-Cr Alloys. J. H. Sye, T. L. Robertshaw and F. M. Richmond. Universal Cyclops Steel Corp. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131614, Dec. 1957, 110 p. $2.50.

Effect of five combinations of incongruous elements on the high-temperature properties of vacuum

melted alloys with a base composition of 60 at. % Ni, 20 at. % Cr, 10 at. % Fe, 10 at. % Co. (Q-general; 2-62, 1-73, AD-q, Fe, *Co, Ni, Cr*)

960-Q. Effects of Temperature-Time-Stress Histories on the Mechanical Properties of Aircraft Structural Metallic Materials. Pt. 1. Temperature-Time Studies for 2024-T3 and 7075-T6 Alclad Sheet. R. E. Fortney and C. H. Avery. Northrup Aircraft, Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131520, Sept. 1957, 214 p. $5.50.

Tensile properties of 2024-T3 Alclad and 707 5-T6 Alclad sheet were determined at room temperature, 200, 300 and 400° F. after single and sequential multiple exposure in the range 250 through 600° F. (Q-general, T24a; 2-62, Al-b, ST, 4-53, 8-66)

961-Q. Metals for High Temperature Hydraulics. Arne Mars and N. M. Lazar. *Aviation Age,* v. 30, Aug. 1958, p. 82-88.

Creep-rupture and fatigue strength of toolsteels and PH stainless. (Q3, Q7, T24, 17-57; TS, SS)

962-Q. Magnesium-Lithium Alloys. *Metal Industry,* v. 92, June 6, 1957, p. 476.

(Q23p, Q27a; Mg, Li)

963-Q. (Russian.) **Sag of Turbine Shafts and Rotors in the High-Temperature Test.** M. Ya. Fuks and I. K. Glazyak. *Vestnik Mashinostroeniia,* no. 6, 1955, p. 30-34.

Tests to determine the ability of turbine shafts and rotors to maintain rectilinear axes when heated. Experimental heating tests on shaft blanks in electric furnace; influence of repeated machining and of surface condition on the temporary bending deflection of shafts. (Q5, T7; 2-62)

964-Q.* (Russian.) **Physical Mechanism of Plastic Deformation of Polycrystalline Iron During Drawing.** Alois Mashin and Miroslav Mrazek. *Acta Technica,* v. 3, no. 3, 1958, p. 218-240.

Experiments using microscope and X-ray on 5.5-mm. Armco iron wire, (composition: 0.015% C, 0.011% Mn, 0.014% P, 0.015% S, 0.03% Ni and 0.005% N). The clearest morphological changes of grain shape took place at temperatures of 44-76°. The major form of deformation is the development of creep in grain boundaries with its consequent disordered mechanism. Appearance of deformation bands is related to temperature level and not to number of times wire is drawn. 13 ref. (Q24, Q3, F28; ST, 4-61)

965-Q.* Effect of Neutron Irradiation on the Mechanical Properties of Copper and Nickel. M. J. Makin. *British Nuclear Energy Conference, Journal,* v. 3, July 1958, p. 174-180.

Effect of neutron irradiation at 100° C. with 5×10^{19} n. per sq. cm. on the mechanical properties of annealed polycrystalline Cu and Ni is studied at a variety of temperatures. The yield stress of both metals is increased by the irradiation, and the increase is markedly temperature-dependent, being very much greater at low temperatures than at high. 10 ref. (Q-general; Cu, Ni, 2-67)

966-Q.* Electron Microscope in the Study of Wear. D. Scott and H. M. Scott. *Electron Microscopy, Proceedings of the Stockholm Conference,* Sept. 1956, p. 331-333.

Replica techniques permit detailed examination of worn areas, effects of fretting corrosion, lubricants, study of debris. 8 ref. (Q9n, M20r; ST, TS)

967-Q.* Transgranular and Intergranular Fracture of Ingot Iron During Creep. L. A. Shepard and W. H. Giedt. *National Advisory Committee for Aeronautics, Technical Note 4285,* Aug. 1958, 32 p.

Creep tests were performed on coarse-grained ingot iron over a temperature range from 700 to 1350° F. to find whether the amount of grain-boundary sliding determined the fracture mode, either transgranular or intergranular. 24 ref. (Q26; Fe)

968-Q.* Effect of Temperature on Dynamic Modulus of Elasticity of Some Structural Alloys. Louis F. Vosteen. *National Advisory Committee for Aeronautics, Technical Note 4348,* Aug. 1958, 21 p.

Effect of temperature from 70-900° F. on Young's modulus of 2024-T3 and 7075-T6 Al alloys, AZ31A Mg alloy, RS-120 Ti alloy, and Type 303 stainless steel, 15 ref. (Q21a, 2-61; Al-b, SS, Ti-b, Mg-b)

969-Q. Energy of a Deformed Crystalline Lattice. N. S. Fastov. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic*

Energy Commission, AEC-tr-2924, 1958, p. 257-264. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

During plastic deformation the greatest part of the total work spent on deformation is dissipated as heat and only a certain part (not more than 10-15%) is transformed into energy of residual stresses—energy of second and third order deformation of the lattice. The overwhelming proportion of the energy of residual stresses is absorbed by third order deformations. During deformation the metal becomes stronger and this strengthening is always accompanied by second and third order deformations. As the degree of plastic deformation increases, the strengthening coefficient decreases. 8 ref. (Q24, M26)

970-Q.* Internal Friction. Stress Relaxation Across Interfaces. P. M. Robinson and R. Rawlings. *Iron and Steel*, v. 31, Mar. 1958, p. 97-100.

Important source of internal friction is stress relaxation across incoherent interfaces, such as grain boundaries and interfaces between different phases. Various investigations and observations on dampening due to relaxation across the grain boundaries are cited. Internal friction due to defects in metals, such as dislocations and vacancies. 51 ref. (Q22)

971-Q. Effect of Alloying Admixtures on the Temperature Dependence of the Shear Modulus of Iron. N. S. Rysina and B. N. Finkelshtein. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission*, AEC-tr-2924, 1958, p. 289-293.

The shear modulus of pure iron, as well as that of Fe alloyed with Co, V or Mn, starts diminshing rapidly at 360°; in Mo steel the modulus remains relatively high to 480°. Above 560°, the modulus of pure Fe drops fastest, while V exerts the maximum detaining action on the reduction in the modulus at these temperatures.
(Q21d, 2-60; Fe, *Co, V, Mn, Mo*)

972-Q.* (Czech.) Mechanical Properties of the Hardened Layer of Cast Iron Rolls. Robert Kamensky. *Hutnicke Listy*, v. 13, 1958, p. 502-505.

Effect of alloy contents and distance from surface on mechanical properties of cast iron rolls. Greatest strength found on external border of hardened layer. Strength fell rapidly in direction of roll center as consequence of grain growth in hardened layer. In transition layer strength increased with graphite content. Modulus of elasticity decreased from surface to center of the roll. Alloying with Mo increased strength of hardened layer and decreased its modulus of elasticity. (Q29, Q-general, W23k, 2-60; CI)

973-Q.* (Czech.) Morphology of a Brittle Structural Component Formed During Resistance Welding of Low-Carbon Steels. Dasaalvan Hrivnak. *Hutnicke Listy*, v. 13, 1958, p. 512-517.

Electron microscope investigation reveals two morphological groups of brittle compound, one without regular design and the other with fine martensitic design. Modification of component characterized by granular substructure; suggests substructure is an orthorhombic unstable crystallization. 4 ref. (Q26s, M27, M21e, K3; CN)

974-Q.* (Czech.) Contribution to the Problem of Longitudinal Crack Formation in Rail Foot After Straightening. Slavomir Horejs. *Hutnicke Listy*, v. 13, 1958, p. 517-526.

Factors contributing to cracking include severe straining during straightening; undersurface bubbles, laminated flat and unfavorably oriented to the surface, fibers in middle sphere of rail foot oriented perpendicular to surface. 27 ref. (Q26q, T23q; ST)

975-Q.* (French.) Formation of Sound Waves in Metal Specimens During Tension Tests. J. B. Lean, J. Plateau, C. Bachet and C. Crussard. *Comptes Rendus*, v. 246, May 19, 1958, p. 2845-2848.

Tension tests were carried out on specimens of extra-mild steel at temperatures ranging from +200 to −196° C. Sound waves are emitted during formation of Luder's lines or waves of plastic deformation corresponding to Portevin-LeChatelier effect. Brittle fracture at low temperature, without appreciable elongation, is preceded by identical sound waves. 4 ref. (Q27, Q21f; ST)

976-Q.* (German.) Creep and Tension Loss of Steel Wire, Particularly at Slightly Elevated Temperatures. Werner Papsdorf and Fritz Schwier. *Stahl und Eisen*, v. 78, July 10, 1958, p. 937-947.

Tests at 22 to 150° C. indicate that creep or loss of tension is a function of heat, load and time. Increasing temperatures, at 55 to 60% load, increase the loss of wire tension up to 1000 hr. Beyond this point, the influence of temperature on tension loss decreases; the same occurs when load is increased at constant temperature. Nature and extent of creep can be projected and trend of tension determined over 100 years. Properties of steel wire are subject to alterations after creep tests have been conducted under heavy loads, and this has been found to be in conformity with the theory of creep at room temperature. 31 ref. (Q3, Q27a; ST, 4-61)

977-Q.* (Japanese.) **Austenitic Stainless Steel Tubes for High-Temperature and High-Pressure Boilers.** Toshio Ikeshima, Jimpel Omori, Toyohiko Okamoto, Eiji Miyoshi, Shoji Terai and Hidetoshi Maruoka. *Sumitomo Metals,* v. 10, Jan. 1958, p. 9-30.

Manufacture of tubes from Types 321 and 327 stainless steels for use in superheaters in modern power boilers. Mechanical properties, tube dimensions and microstructure at room temperature. Mechanical properties at elevated temperatures (400 to 800° C.), creep-rupture properties, effect of long-time heating on brittleness and other mechanical properties, oxidation resistance, microstructure following heating. Microstructure and mechanical properties of joints made by arc welding and inert-gas shielded-arc welding utilizing various electrodes before and after prolonged exposure to high temperatures. Influence of severe cold bending on tube dimensions, mechanical properties and microstructure.
(Q-general, 2-62, T26q; SS, 4-60)

978-Q.* (Japanese.) **Fatigue Test Results With Large Shouldered and Force-Fitted Specimens.** Naoteru Oda and Kunio Nishioka. *Sumitomo Metals,* v. 10, Jan. 1958, p. 37-44.

Investigation of fatigue limit of stress concentration portion of railway car axles. Radius of fillet, specimen dimension and cracking corrosion related to the fatigue strength. 12 ref. (Q7k, Q7b, T7j; ST)

979-Q.* (Japanese.) **Rotating-Beam Fatigue Test of Cast Aluminum Alloys.** Katsuzi Takeuchi. *Sumitomo Metals,* v. 10, Jan. 1958, p. 45-54.

Tests on Alcoa 195, Lautal, SAE 326, SAE 329, Silumin, Gamma-Silumin, SAE 331, Alcoa 356, Y-alloy, Cobitalium, Hydronalium, Low-EX, Alcoa D 132 and RR 53 cast alloys in the ascast and heat treated conditions. Relation between fatigue strength at 10^7 cycles and tensile properties. Fatigue strength increased with increment of tensile strength up to 32 kg. per sq. mm., then decreased with further increment of tensile strength. 4 ref.
(Q7c, Q27a; Al-b, 5-60)

980-Q.* **Thick-Walled Steel Cylinders. Behavior Under Internal Pressure.** B. Crossland and J. A. Bones. *Machinery Market,* July 31, 1958, p. 17-20.

Test on thick-walled cylinders made from 0.15% C steel, 0.3% C steel and Vibrac steel, the maximum pressure reached being 42 tons per in. (Q10; CN, 4-60, 3-74)

981-Q. On the Plastic Properties of Modified Steel Kh25N20 in the Cast State. V. E. Neimark and Ya. B. Gurevich. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 439-449. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Modification of steel Kh25N20 with Ti or B improves its plastic properties in the hot state. Cast steel Kh25N20 with columnar structure has good plastic properties at room temperature, which makes it possible, with suitable tolerances for the castings, to work it in the cold state. Diffusion anneal (1250° for 1 hr.) destroys the dendrite eliquation in the cast steel and improves its plastic properties at room temperature. 24 ref.
(Q23, 2-62, 2-60; AY, *Ti, B*)

982-Q. On the Deformability of Cast Steel of Type Kh25N20. Ya. B. Gurevich and V. E. Neimark. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 450-456. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Under definite conditions of working, cast steel of type Kh25N20 with columnar macrostructure has adequately high plasticity both in the hot and the cold state. The cast metal needs to be subjected to a diffusion anneal at 1250° to remove the dendrite eliquation and destroy the chi-phase, followed by cooling

in water to prevent the separating out of carbides on the grain boundaries. The allowable reduction in hot rolling is 60 to 65%. 10 ref. (Q23q, 2-62, 2-64; ST, 5-60)

983-Q.* The Influence of Ferrite Banding on the Impact Properties of Mild Steel. W. S. Owen, Morris Cohen and B. L. Averbach. *Welding Journal,* v. 37, Aug. 1958, p. 368s-374s.

Object was to compare the Charpy properties of a severely banded ferrite-pearlite structure with those of a random ferrite-pearlite distribution. Ferrite banding in reheated hot rolled mild steel is influenced by the austenitizing temperature, the time at temperature and the cooling rate. Once the banding has been completely removed by a homogenizing heat treatment, it is not re-formed by thermal treatment. 10 ref. (Q6n, Q24c, 2-64; CN)

984-Q.* Material Rating Based Upon True Stress-Strain Properties. Joseph Marin and M. G. Sharma. *Welding Journal,* v. 37, Aug. 1958, p. 375s-378s.

Interpretations were based upon data for 56 materials. Material ratings based upon the nominal and true properties are not the same. Recommended that ratings be based upon true stress-strain relations. 11 ref. (Q27, Q25n, S22)

985-Q.* (Russian.) Study of Physical Factors Determining Hardness of Iron Alloys. V. M. Golubkov, V. A. Il'ina and V. I. Kritskaya. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 465-483.

Relationship between thin crystal structure of hard alloys (using alpha-iron in hardened condition) and mechanical properties. The alloys were hardened by cold plastic deformation. To change the properties of alpha-iron crystals in the micro and submicro regions, the iron was alloyed with Si, Ti, V, Cr, Mn, Co, Ni, Nb, Mo and W. Static and dynamic displacements of atoms in crystal lattice were studied by X-ray. 38 ref.
(Q29n, M25, M26, 3-68; Fe-b)

986-Q.* (Russian.) Effect of Static Distortion of Crystal Lattice on Mechanical Properties of Aluminum and Magnesium Alloys. A. V. Grin', V. A. Pavlov and I. A. Pereturina. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 493-500.

Thermal dependence of the yield point and temporary resistivity of pure Al and its alloys at temperatures of 80 to 700° K. during 100-fold increase in speed of deformation. For pure Al at a temperature of 500° K., the relation between yield point and modulus of elasticity are not affected by temperature. However, a further rise in temperature increasingly affects this relationship. 23 ref.
(Q21a, Q23b, M26s, 2-61; Al-b, Mg-b)

987-Q. Plasticity of Heat Resistant Alloys Depending on Structure and Kind of Stressed State. M. V. Rastegaev. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 30-35. (Henry Brutcher, Altadena, Calif., Translation no. 4280.)

Plasticity of heavily deformed alloys, at the time of deformation at high temperatures and under expansion pressures, depends mainly on the form of diffusion of the second phase not in its original structure but in the structure formed during heat treatment at the moment of the start of deformation. 9 ref.
(Q24, N1, 2-62, 2-64, 3-74; SGA-h)

988-Q. Structure and Properties of Alloys After Vibrational Deformation. S. N. Shestakov and M. Ya. Karnov. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 35-38. (Henry Brutcher, Altadena, Calif., Translation no. 4281.)

Deformation by vibration results in more uniform macro and microstructure and smaller grain formation after recrystallization. Also there is greater uniformity in the hardness after vibration and lowered specific pressure. Vibro-deformation can also be used to reduce intersurface friction. Rejects common assumption that the vibration of machinery and material during usual operations is invariably harmful.
(Q24, Q29n, M27c, M28k, 3-74)

989-Q.* On Asperity Distributions of Metallic Surfaces. F. F. Ling. *Journal of Applied Physics,* v. 29, Aug. 1958, p. 1168-1174.

A distribution of surface asperities is proposed for the case in which both mating surfaces are rough and asperities are in the form of right circular cones. The load-compliance characteristics for mating surfaces having comparable roughness have slopes much steeper than those predictable by previous theories, all of which involve the assumption that one of the surfaces is smooth and rigid. 12 ref.
(Q9p, S15; ST, Al, Cu-n, 10-52)

990-Q.* Investigation of Low-Temperature Internal Friction. Hollis L. Caswell. *Journal of Applied Physics,* v. 29, Aug. 1958, p. 1210-1214.

Internal friction in pure copper, in Cu doped with Ni and Au, and in Mg, subjected to various amounts of cold work was measured at 40 kc. from 4° K. to 300° K. 11 ref. (Q22; 2-63, Cu, Mg, *Ni, Ag*)

991-Q. (Russian.) **On the Problem of the Nature of Reversible Temper Brittleness.** L. R. Gold'shtein. *Metallovedenie i Obrabotka Metallov,* no. 11, 1956, p. 36-39.

Electron microscope and electron diffraction study of temper brittleness in steel 33 KhNZ after oil quenching from 1150° C. followed by tempering at 600 and 675° C., with different cooling rates. Destructive testing produced brittle fracture after slow cooling and ductile after rapid cooling. In both cases carbide particles were present on the fracture face. It is suggested that one of the causes of reversible embrittlement is the healing and development of breaks in the primary austenite grain boundaries as a result of the volume changes occurring during tempering, mainly in the alpha-phase and depending on the nature and amount of alloying elements. (Q26s, 2-64; AY)

992-Q. Solve Lamellar Phase Problem in A-286. Kenneth Metcalfe. *Iron Age,* v. 182, July 3, 1958, p. 72-74.

Formation of lamellar precipitate at grain boundaries results in lower stress-rupture life of A-286 stainless alloys. Lamellar phase eliminated by controlling boron content or solution treatment at 2000° F. (Q3m, N7; SS-e, *B*)

993-Q. Thermal Stresses in Design. S. S. Manson. *Machine Design,* Aug. 7, 1958, p. 100-107.

Stress-strain mechanisms; quantitative analysis; failure by plastic-strain cycling; metallurgical aspects. 11 ref. (Q25p, 17-51)

994-Q. Investigations on the Rolling and Recrystallization Textures of Carbonyl-Iron. Frank Haussner and Helmut Weik. *Archiv für das Eisenhüttenwesen,* v. 27, Mar. 1956, p. 153-160. (Iron and Steel Institute Translation no. 997.)

Previously abstracted from original. See item 389-Q, 1956. (Q24, N5, CN)

995-Q. Indication of the Tendency to Brittle Fracture of Steels by Measurement of Yield Stress, Tearing Stress and Contraction on Fracture, on Tri-Axially Stressed Specimens. Albert Kochendorfer and Christof Rohrbach. *Archiv für das Eisenhüttenwesen,* v. 26, Apr. 1955, p. 213-227. (Iron and Steel Institute Translation no. 800.)

Previously abstracted from original. See item 568-Q, 1955. (Q23b, Q26s; ST)

996-Q. New Experimental Results Concerning the Importance of the Surface Effect on Fatigue. O. Lissner. *Jernkontorets Annaler,* v. 140, 1957, p. 380-389. (Iron and Steel Institute Translation no. 996.)

Previously abstracted from original. See item 1068-Q, 1957. (Q7; AY)

997-Q. (French.) **Influence of Welds on the Behavior of Metal Products.** Pierre Roblin. *Revue de la Mecanique,* no. 109, Mar. 1958, p. 127-131.

(Q-general; 7-51, 17-51)

998-Q. (German.) **How to Determine the Right Value for Resistance in Triaxial Plastic Deformation.** Zygmunt Wusatowski. *Freiberger Forschungshefte,* v. B27, 1958, p. 5-27.

A mathematical study based on the change in shape of the object deformed. The values obtained by measuring are used for computing the stresses and the resistance to deformation. 52 ref. (Q24)

999-Q. (Russian.) **Influence of Magnesium on Mechanism of Plastic Deformation of Aluminum-Magnesium Alloys.** V. I. Syutkina and E. S. Yakovleva. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 501-507.

Concentration of Mg atoms on the Al grain boundaries accounts for its increasing hardness. 13 ref. (Q24, Q29n, 2-60; Al, *Mg*)

1000-Q. (Russian.) **Effect of Phase Disintegration of Supersaturated Hard Alloys on Plastic Deformation.** N. F. Syutkin. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 508-515.

Study of intermittent plastic deformation of cylindrical objects made of Zn with 20% Al. The first "skipping" in the deformation appears at the very beginning of the rectolinear part of the ascending section of the tension diagram. 6 ref. (Q24, 2-60; *Al,* Zn-b)

1001-Q. (Russian.) **Evaluation of Impact Ductility and Cold Brittleness in Zone Adjacent to Weld.** M. M. Kraichik. *Svarochnoe Proizvodstvo,* July 1958, p. 27-29.

5 ref. (Q23p, Q26s, K9r)

1002-Q. (Russian.) **Determination of Tensile Strength of Steel at Low Temperatures.** L. S. Livshits and A. S. Rakhmanov. *Zavodskaya Laboratoriya,* v. 24, May 1958, p. 622-625.

Method consists of device which measures effect of temperature variation on copra pendulum. (Q27, 2-63, 1-53; ST)

1003-Q. (Russian.) **Precise Measurement of Microhardness by Chemical Removal of Case Hardened Surface Layers.** V. N. Vigdorovich and A. E. Vol'pyan. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 762-764.

Use of various etching solutions in testing surface of Cu alloys. For Cu-Al an etch solution of $FeCl_3$ in HCl is recommended; for Cu-Ti alloy, etch with $K_2Cr_2O_7$ plus NaCl in H_2SO_4. 5 ref. (Q29q, 1-54)

1004-Q. (Russian.) **Effect of Bending During Torsion Tests.** B. A. Vandyshev and E. E. Surikova. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 764-767.

Recommends clamping device to overcome destructive effect of torsion tests. 7 ref. (Q1, 1-53)

1005-Q. A Phenomenological Relation Between Stress, Strain Rate and Temperature for Metals at Elevated Temperatures. Elbridge Z. Stowell. *National Advisory Committee for Aeronautics, Report 1343,* 1958, 6 p.

Phenomenological relation is suggested to account for behavior of polycrystalline metals above the equicohesive temperature. Properties of the metal included in the relation are elasticity, linear thermal expansion and viscosity. 9 ref. (Q25n, Q21, P10d, P10f; Al-b, 2-62)

1006-Q. Chromium-Nickel Alloys for High-Temperature Applications. A. G. Bucklin and N. J. Grant. Massachusetts Institute of Technology. (U. S. Bureau of Aeronautics.) *U. S. Office of Technical Services,* PB 131465, 1955, 18 p. $.50.

Chromium-nickel alloys containing 35 to 70% Cr with additions of Fe, Mo and Cb were precision cast and tested in stress-rupture at 1600 to 1800° F. Characteristics said to surpass those of many commercial alloys were obtained, especially in alloys containing 40 to 45% Cr, 2 to 10% Fe, 2% Mo and 2% Cb. Higher Cr alloys exhibited high hardenability, suggesting high-temerature bearing applications. (Q-general, 2-62, 17-57; SGA-h, Cr, Ni, 5-62)

1007-Q. Theory of Creep of Dispersion-Hardened Alloys. J. Weertman. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131675, Apr. 1958, 11 p. $.50.

Introduction of a finely dispersed second phase into a metal matrix is said to be the best method of improving creep resistance. The dispersed second-phase particles act as obstacles to the motion of dislocations and thus harden the alloy. This research was concerned with development of creep equations for two-phase dispersion-hardened alloys. All calculations were based on the assumption that the rate-controlling process is the climb of dislocations over second-phase particles. (Q3, N7)

1008-Q.* (English.) **Some Observations on Deformation Structures in Hand Impact Tools and in Splinters From Such Tools.** Axel Hultgren. *Jernkontorets Annaler,* v. 142, no. 5, 1958, p. 229-245.

Deformation structures showing indications of shearing heat causing transformation to austenite in a thin layer followed by martensite formation. (Q24c, Q24m, N8f, N8p, 3-68, 3-71; CN-p)

1009-Q.* (French.) **Structural Theory of Metallic Creep.** A. Oding. *Revue de Metallurgie,* v. 55, May 1958, p. 448-452.

Starting from the dislocation concept, a theory of creep is developed according to which the creep rate depends on the number of dislocations ready to begin movement. A general equation for the creep curve, in agreement with experimental data, is derived. (Q3, 10-51)

1010-Q.* (French.) **Rheological Aspects of Hardness.** A. Braun. *Revue de Metallurgie,* v. 55, May 1958, p. 470-474.

Three categories of the properties of solids are distinguishable: elasticity, plasticity and viscosity. Analysis of behavior at local deformations set up by stresses to which solid offers a resistance, which is designated hardness, shows

necessity of defining hardness related to the above three categories. Their significance flows from their relation with the respective constants of elastic, plastic or viscous matter, a relation which is called "hardness function" and which shows also whether these hardnesses are dependent on experimental conditions. (Q29)

1011-Q.* (French.) **Fatigue Under Fretting Conditions.** A. J. Fenner and J. E. Field. *Revue de Metallurgie,* v. 55, May 1958, p. 475-485.

Direct stress fatigue tests on Al alloy and on mild steel, both without clamps and under various conditions of clamping. Fretting was caused by the alternating strain in that part of the specimen spanned by the clamps, leading to reduction in fatigue strength. In Al the amount of this reduction was found to depend on the amplitude of the relative movement between clamps and specimen. 7 ref. (Q7, Q9q)

1012-Q.* (French.) **Investigation of Intercrystalline Fragility in Iron.** C. Bealieu. *Revue de Metallurgie,* v. 55, May 1958, p. 495-499.

Determination of temperature conditions and time of annealing required for brittleness. Brief elevation of temperature above A_3 or any modification of the structure of the specimen suffices to eliminate this brittleness. Various explanations of this phenomenon, which is different from brittleness, obtained after saturation with cathodic hydrogen. The fracture source would be due to formation of accumulations of dislocations and microfissures in vicinity of oxide precipitates or grain boundaries where cohesion is reduced. (Q26s; Fe)

1013-Q. (Russian.) **Effect of Local Plastic Deformation on the Strength of Steel.** A. E. Asnis. *Avtomaticheskaya Svarka,* no. 3, 1956, p. 88-94.

Effect of local cold work on static and fatigue strength of rimming and killed bessemer steel BST3 and openhearth steels MST3 and M16c. Tests were carried out at +20 and −20° C. As a result of local cold work by both shearing and punching the yield point of all the steels tested in tension rose by 5-12% while the ultimate tensile strength was reduced by almost 20% in BST3 and M16c and by not more than 8% in MST3. The effect was particularly pronounced at low temperature. Normalizing removes the effects of local cold work and almost completely restores the tensile properties. (Q27a, Q7a, 3-68; ST)

1014-Q. (Russian.) **Investigation of Plastic Properties of Beryllium Monocrystals.** R. I. Garber, I. A. Gindin, V. S. Kogan and B. G. Lazarev. *Fizika Metallov i Metallovedeniye,* no. 3, 1955, p. 529-537.

Mechanism of slipping of Be depends substantially on the temperature and orientation of the specimen. The plasticity of Be, which increases monotonically with temperature, reaches a maximum at 400° C., diminishes somewhat at 600° C., and increases again at 800° C. (Q24, 3-72; Be)

1015-Q. (Russian.) **Plastic Deformation in an Isotropic Metal Under Complex Loading.** A. M. Zaukov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1956, p. 72-87.

Test pieces were of Cr-Ni steel 30KhNZA with 0.30% C, 0.37% Si, 0.64% Mn, 0.74% Cr, 2.9% Ni. Pieces were oil quenched from 820° C. and tempered at 540° C. After soaking for 2 hr. one batch was oil quenched, while the other was held for another 10 hr. at 500° C. and then furnace-cooled. Reduction of impact value by half as a result of heat treating the steel does not affect its plastic properties under complex loading conditions. (Q24, 2-64; AY)

1016-Q. (Russian.) **Problem of Changes of Intensity of X-Ray Lines During the Deformation of Polycrystals.** B. I. Smirnov. *Zhurnal Tekhnicheskoi Fiziki,* no. 1, 1957, p. 218-220.

Changes in intensity of X-ray diffraction lines were measured during the deformation of polycrystalline Armco Fe. Cylindrical specimens previously vacuum-annealed at 600° C. were deformed in compression perpendicular to the axis, in steps of a few per cent. After each step, X-ray exposures were made on the lateral surfaces of the specimens. The (110), (220), (211) and (220) lines were studied. The specimen was not rotated during the exposure, its axis being set perpendicular to the axis of rotation of the counter. (Q24, M22g; Fe)

1017-Q.* (Swedish.) **Veining in Ferrite.** A. Hultgren, A. Josefsson, E. Kula and G. Lagerberg. *Jernkontorets Annaler,* v. 142, no. 4, 1958, p. 165-202.

Deformation of hot worked steels. Veining or subboundary network showed greatest regularity of direction and was more closely meshed the higher the rate and the lower the temperature of deformation. Large grain size favored regular sub-boundaries. Three modes of etching of sub-boundaries, ridge veins, groove veins and level veins occurred together in a grain section under certain conditions, depending on orientation of section, carbon or nitrogen content and rate of cooling. Minimum amount of dissolved carbon or nitrogen was required for appearance of ridge vein; vein increased with an increase of these elements. Sub-boundaries in (100) sections always appear as groove veins. Level veining caused by differences in orientation between adjacent subgrains. 21 ref. (Q24, M26c, M27f, 2-60, 2-59, 3-68; CN-d)

1018-Q. Crack Propagation Tests of High-Strength Sheet Steels Using Small Specimens. J. E. Srawley and C. D. Beachem. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131682, Apr. 1958, 30 p. $1.

Test for high-strength sheet materials for current and projected rockets and high-speed aircraft provide a means of distinction between materials which could be expected to behave reliably in highly stressed structures and those which would be sensitive to minute stress-raisers. (Q26q, 1-54; ST, 4-53, SGB-a)

1019-Q. Cast Age-Hardenable Austenitic Steels. E. A. Lange, N. C. Howells and A. Bukowski. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131733, May 1958, 16 p. $.50.

Cr-Ni-P, Cr-Mn and Cr-Ni-Mn-V types of age hardenable, austenitic steels which have high strength in wrought forms were investigated for use as high-strength, nonmagnetic castings. A Cr-Ni-P austenitic steel with 0.3% C and 0.25% P developed yield strength at the 100,000-psi. level. The Cr-Mn austenitic steels containing phosphorus or vanadium were age hardenable, but castings of these alloys were brittle when heat treated to high strength. (Q27a; SS, 5-60; SGB-a)

1020-Q. (Russian.) **Creep of Aluminum Under Dynamic Loads.** A. A. Presvoditelev and B. A. Smirnov. *Vestnik Moskovskogo Universiteta,* no. 3, 1956, p. 51-55.

Creep tests of Al subjected to additional impact-pulsating loads. The load, produced by an eccentric mechanism, was applied to the lower jaw and the static load was applied to the upper one. Deformation was determined photographically using a system of mirrors. (Q3, 1-54, 1-53; Al)

1021-Q. Final Report—Development and Testing of Air-Melted Nickel-Molybdenum Alloys With Minor Alloying Additions. O. Preston, C. F. Floe and N. J. Grant. *U. S. Atomic Energy Commission ORNL-2520,* 1958, 41 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

Stress-rupture, tensile and embrittlement testing of six 4800-lb. air-melted experimental heats of Ni-Mo alloys containing 13 to 20% Mo with additions of Mn, Fe, Si, Cr, Al, Ti, W, Cb and C. Results for commercial Hastelloy B included for purposes of comparison. Addition of minor alloy elements is effective in eliminating the embrittlement previously reported. (Q-general, Q26s, 2-60; Ni, Mo)

1022-Q. (Polish.) **On the Possibility of Replacing Long-Time Creep Tests by Short-Time Tests.** W. Tomaszczyk. *Hutnik,* v. 23, no. 12, 1956, p. 459-462.

Use of Larson-Miller method for determining service life of certain austenitic steels of Cr-Mo, Cr-Mo-V and Cr-Ni-W-Mo types. The constant C in the cases analyzed varies in the range 17-24. When the proper value is taken for C the steels analyzed obey the Larson-Miller relationship well for drops in temperature of up to 200° C. (Q3; AY)

1023-Q. (Russian.) **Mechanism of the Influence of Phosphous and Molybdenum Additions on Temper Brittleness of Steel.** V. I. Arkharov, S. I. Ivanovskaya, N. M. Kolesnikova and T. A. Fofanova. *Fizika Metallov i Metallovedeniye,* v. 2, no. 1, 1956, p. 57-65.

Specimens of Cr-Ni structural steel with normal and higher content of P (within its solubility limits) were heat treated to produce a brittle state. P content is substantially higher in the surface layer of brittle fracture than in that

obtained in impact fracture. Analogous results were obtained with steels of the same composition, but with Mo added.
(Q26s, 2-60; AY, *P, Mo*)

1024-Q. (Russian.) **Concerning the Additiveness of Mechanical Properties of Metallic Alloys and Mixtures.** Ye. M. Savitskiy and V. V. Baron. *Izvestiya Sektora Fizika Khimicheskogo Analiza IONKh Akademii Nauk SSSR*, v. 27, 1956, p. 86-96.

Using the systems Mg-Si, Mg-Ge, Cu-Si, Al-Cu, Ni-Si and Co-Si as examples, it is shown that the mechanical properties of two-phase metallic mixtures depend substantially on the mutual distribution of the structure of components in these mixtures. (Q-general, 3-71)

1025-Q. (Russian.) **Heat Resistance of Alloys of the Quaternary System Nickel - Chromium - Aluminum - Columbium.** I. I. Kornilov and L. I. Pryakhina. *Issledovaniya po Zharoprochnym Splavam. M., Akademii Nauk SSSR*, v. 27, 1956, p. 138-147.

The maximum heat resistance is produced by those compositions of quaternary alloys corresponding to the transition region from solid solutions to alloys having a heterogeneous structure. These alloys have a structure of saturated and supersaturated solid solutions with finely dispersed segregation of the excess phase. (Q-general, 2-62, M27; Ni, Cr, Al, Cb)

1026-Q. (Russian.) **Effect of Superheat Temperature and the Introduction of Magnesium on the Properties of Spheroidal Graphite Cast Iron.** E. E. Farafonov and M. S. Kolmakova. *Liteinoe Proizvodstvo*, no. 3, 1957, p. 14-16.

Low-temperature introduction of Mg and high temperature of superheat of the metal improves mechanical properties and quasi-isotropy of spheroidal graphite cast iron.
(Q-general, E25q; CI-r)

1027-Q.* (Russian.) **Effect of Steel Composition on Formation of Hot Cracks in Castings.** N. A. Trubitsyn and P. I. Bidulya. *Liteinoe Proizvodstvo*, June 1958, p. 22-26.

Study of microstructure of low-alloy steels with varying sulphur contents shows that, regardless of the steel's identical content of carbon and phosphorus, the greater the sulphur content the greater the tendency toward hot crack formation because sulphur increases nonmetallic inclusions in grain boundaries. The ratio of Mn to S does not alter these conclusions. 10 ref. (Q26q, 2-60; ST, *S*, 5-60, 9-69)

1028-Q. (Russian.) **Study of Impact Fatigue.** N. N. Davidenkov and E. I. Belyaeva. *Metallovedenie i Obrabotka Metallov*, v. 11, 1956, p. 4-10.

Static and impact fatigue was studied on specimens of steels KDLVT (cast) and U8 in the annealed condition, normalized steel 45Kh, fully tempered steels 45Kh, 30Khgsa, KDLVT (cast and forged), 55GS and U8. In the impact tests the strain rate was 10 times faster than in the static tests. The value of stress in the static tests was measured by means of the bending moment. The dynamic coefficient is 1.14.19 for steels in the annealed condition, 0.97-1.01 for the normalized and fully tempered conditions, 0.90-0.91 for the medium-tempered condition, and 0.80-0.91 for the low-temperature tempered condition. This descending order is explained by the part played in the hardening of the steel by carbide hardening which occurs less readily as the strain rate increases. 14 ref. (Q7, 1-54; ST)

1029-Q. (Russian.) **Relaxation of Oriented Micro-Stresses. Pt. 1.** B. M. Rovinskii and V. G. Liuttsau. *Zhurnal Tekhnicheskoi Fiziki*, no. 2, 1957, p. 345-350.

Investigated by studying the relaxation of elastic deformation of the lattice in metals under simple extension, using cylindrical test pieces of pure Al (99.99%) and Cu (99.92%) having a mean grain size of about 0.02 mm. (Al) and 0.05 mm. (Cu). Character of the relaxation processes in both micro and macrostresses is essentially identical. Both processes of relaxation are achieved basically as a result of elemental shifts in the crystal grains. (Q21, Q25; Al-a, Cu-a)

1030-Q. (Ukrainian.) **Effect of the Machining of Steel on Its Fatigue Strength.** G. V. Karpenko and A. I. Yatsyuk. *Dopovidi Akademii Nauk Ukrains'koi SSR*, v. 1, 1957, p. 23-26.

Effect of ordinary machine turning, heavy turning, grinding and roll-peening on fatigue strength of cylindrical specimens in steel U8A quenched to sorbite, normalized steel 45 and steel 20Kh. Heavy

turning lowers the fatigue strength in air and even more in water. Subsequent grinding to small tolerances does not remove the ill effects of heavy turning. Roll-peening considerably increases the fatigue strength after all forms of machining, but especially after heavy turning. (Q7a, G17, G23n; ST)

1031-Q. (Russian.) Intergranular Cracks in Steel Castings. D. K. Butakov. *Liteinoe Proizvodstvo*, June 1958, p. 20-22.

Steels with structurally free ferrites which are distributed on the surface of austenitic crystals have tendency to form cracks. 7 ref. (Q26p, M27; ST, 9-72)

1032-Q. A High-Temperature Vacuum and Controlled Environment Fatigue Tester. G. J. Danek, Jr., and M. R. Achter. Naval Research Laboratory. *U. S. Office of Technical Services*, PB 131737, May 1958, 12 p. $.50.

Equipment for reverse-bending fatigue tests at elevated temperatures in vacuum. Large strain amplitudes at low frequencies are used to produce failures in approximately 10^5 cycles. Equipment may be used for metallographic investigations of fatigue damage and crack initiation and growth at elevated temperatures. A major design problem, the transmission of motion through a vacuum seal, was circumvented by the use of a magnetic coupling driven at the resonant frequency of the specimen. (Q7, 1-53, 1-73)

1033-Q. Internal Friction in Deformed Alloys of Aluminum With Magnesium. A. V. Grin and V. A. Pavlov. *Physics of Metals and Metallography*, v. 4, no. 1, 1957, p. 81-87. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 1057-Q, 1957. (Q22, 3-68; Al, Mg)

1034-Q. Investigation of the Deformation of Metals Under Small Stresses on Some Regularities of Creep in Copper and Aluminum. B Ya. Yampolski and T. A. Amfiteatrova. *Physics of Metals and Metallography*, v. 4, no. 1, 1958, p. 106-114. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 1058-Q, 1957. (Q3; Al, Cu, 4-51)

1035-Q. Mechanism of Plastic Deformation, and Mechanical Properties, of Aluminum. Pt. 1. Study of the Mechanism of Plastic Deformation of Aluminum by Marks Arising on Its Surface During Extension. E. A. Iakovleva. *Physics of Metals and Metallography*, v. 4, no. 1, 1957, p. 115-120. (Translation by Pergamon Institute.)

Mechanism of plastic deformation of Al changes with the varying conditions of straining. Increase of temperature and decrease of speed of test influence the mechanism of deformation in the same direction Making use of a wide range of speeds of elongation made it possible to follow the transition from the displacement to the atomic diffusion mechanism of deformation at one and the same temperature, roughly 250° C. 9 ref. (Q24; Al)

1036-Q. Mechanism of Plastic Deformation and of the Mechanical Properties of Aluminum. Pt. 2. Formation of Blocks in the Grain of Aluminum During Plastic Deformation. E. S. Iakovleva. *Physics of Metals and Metallography*, v. 4, no. 1, 1957, p. 120-125. (Translation by Pergamon Institute.)

The size and degree of disoriented areas are unequal if the conditions of straining are different. At low temperatures these areas are weakly formed by disoriented blocks. The over-all angle of disorientation of the blocks at 2% elongation does not exceed 1°. With the increase of deformation the angle of disorientation increases and the block size decreases. 7 ref. (Q24; Al)

1037-Q. One Method of Determining Fracture Strength. L. M. Kachanov and A. L. Nemchinskii. *Physics of Metals and Metallography*, v. 4, no. 1, 1957, p. 125-132. (Translation by Pergamon Institute.)

Fracture strength of low-carbon steel depends essentially on the small degree of deformation before rupture. If the stressed condition is reinforced somewhat so that the deformation before rupture is, for example, 0.1% of the length, then the fracture strength of low-carbon steel with grain no. 2 is 1.5 times greater than the value established by testing the usual smooth fractured surfaces in nitrogen. 7 ref. (Q26r; CN-g)

1038-Q. Deformation Texture of Cold Rolling in Low-Carbon Steel. K. V. Grigorov and G. P. Blokhin.

Physics of Metals and Metallography, v. 4, no. 1, 1957, p. 133-139. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 1060-Q, 1957. (Q24, M26c; CN-g)

1039-Q. Variation in Plasticity of Transformer Steel in the Process of Cooling. S. I. Doroshek, N. I. Lapkin and G. N. Shubin. *Physics of Metals and Metallography*, v. 4, no. 1, 1957, p. 140-143. (Translation by Pergamon Institute.)

Previously abstracted from original. See item 1061-Q, 1957 (Q23p, J23; ST, SGA-n)

1040-Q. (Bulgarian.) **Some Problems in the Technology of Producing Articles in Hadfield Manganese Steel.** Y. L. Dimitrov. *Tezhka Promishlennost*, v. 5, no. 12, 1956, p. 52-58.

Effects of chemical composition, production technology and heat treatment conditions on mechanical properties. The Mn:C ratio should be greater than 10, otherwise there will be a considerable amount of carbides in the steel. Reduction of carbon to 1% and lower impairs wear resistance. The optimum Si content is 0.6-0.5%. The cause of hot tearing and cold cracking is insufficient deoxidation. Homogenization at 1065° C. dissolves the carbides in solid solution. Heat treatment is best done in gas-fired holding furnaces. (Q-general, 2-60, 2-64; AY, *Mn*, SGA-m)

1041-Q. (Czech.) **Temperature Regulation During Long-Time Creep Testing.** B. Sestak. *Hutnicke Listy*, v. 12, no. 3, 1957, p. 202-206.

Review of existing thermo-regulators used for creep testing and two now types of dilatometric thermo-regulators for resistance furnaces and the necessary equipment. The proposed design has given completely satisfactory results (±1° C. temperature variation up to 700° C.). (Q3, X9, 1-53)

1042-Q.* (German.) **Tests on the Penetration Hardness and Grinding Hardness of Hard Metals.** P. Grodzinski. *Werkstattstechnik und Maschinenbau*, v. 48, July 1958, p. 364-372.

Tests performed with double-cone shaped penetration diamonds on hard materials such as diamonds, silicon carbide and different kinds of corundum, and tests with double-cone grinding stones of different materials on diamonds, silicon carbides, synthetic corundum and hard metals. Applicabilities of the method to ceramics, glazes, glass, hardened steel, pencil leads, abrasive disks, lubricants. (Q29c, 1-54)

1043-Q. (Polish.) **Preparation of Specimens and Tension Tests.** B. Otta and J. Teindl. *Hutnik*, v. 7, no. 1, 1957, p. 14-15.

Effects of filing and necking during a tension test on the elongation and tensile strength of metallic specimens. In cutting out a specimen for test, there is strain hardening at the point of cutting, so that the test yields an enhanced strength figure. Unfiled specimens have a tensile strength which is 6.6% higher than that of unfiled ones. Elongation can only be accurately determined when the tension test specimen fails in the middle. It was found that even a slight contraction greatly reduces elongation in tension tests. (Q27, 1-60)

1044-Q. (Polish.) **Hydrogen Corrosion of Steel and Procedures for Its Prevention (Hydrogen Brittleness of Steel).** Zabik Wladyslaw. *Przeglad Mechaniky*, v. 16, no. 2, 1957, p. 58-64.

Temperature has the greatest effect on diffusion of H and H embrittlement. Examples of embrittlement during acid pickling of Fe. Effect of composition of the scale on rate of evolution of H; effect of carbon content of the steel. Alloying of steel with Si, Cu and Ni does not increase its resistance to embrittlement; Mn, Mo and W have little effect, whereas Cr, V, Ta, Nb and especially Ti are effective. (Q26s, 2-60, 2-61; AY, *H*)

1045-Q. (Russian.) **Diagram of Composition Versus Refractoriness of Alloys of the Ternary System Nickel-Chromium-Titanium.** I. I. Kornilov and L. I. Pryakhina. *Izvestiya Akademii Nauk Otdelenie Tekhnicheskii Nauk*, no. 7, 1956, p. 103-110.

Hardness, electric resistivity, microstructure and refractory properties of the system Ni-Cr-Ti with constant Cr content (10% and 20%) and variable Ti content (from 0 to 15%). (Q29n, Q-general, 2-62; P15g, 2-60; Ni, Cr, Ti)

1046-Q. (Russian.) **Relation Between Composition, Temperature and Heat (Creep) Resistance. Pt. 3. Alloys of the Nickel-Chromium-Tungsten-Aluminum-Titanium System.** I. I. Kornilov and F. M. Titov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 10, 1956, p. 117-122.

Effect of Ti on the creep resistance between 600 and 1250° C. of nickel alloys with 20% Cr, 6% W, 4.5% Al; Ti content was changed from 0 to 10% by replacement of Ni. Solubility of Ti in the alloy solid solution was studied between 850 and 1180° C. by metallography, from the change in hardness during aging for 450 hr. at 850-950 and 1000° C. and by measurement of the lattice constant of the solid solution, and was found to be 4.5% at 1180° C., 1.5-2% at 1000-1100° C., and less than 1% at 800-900° C. and below.
(Q3m, 2-60; Ni-b, *Cr, W, Al, Ti*)

1047-Q. (Russian.) **Effect of Heat Treatment on Notch Sensitivity of Chromium-Molybdenum Steel.** Z. N. Petropavlovskaya. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 54-58. (Henry Brutcher, Altadena, Calif., Translation no. 4287.)

Heat treatment was shown to have special effect on notch sensitivity of Cr-Mo steel during tensile strength tests. By modifying heat treatment conditions the notch sensitivity and brittleness of this steel can be altered. For steels with composition of 1.5-2.5% Cr; 0.5-1% Mo and 0.2-0.5% V, it is recommended that a two-fold normalizing procedure take place, beginning at a high temperature (1040°), then a lowering to 960°, followed by annealing at 680°. 5 ref.
(Q23s, 2-64; AY, *Cr, Mo*)

1048-Q. (Russian.) **Effect of Temperature on the Shape of the Composition Versus Heat Resistance Curve.** M. V. Zakharov. *Sbornik Nauchnykh Trudov Moskovskogo Instituta Tsvetnykh Metallov i Zolota,* no. 25, 1955, p. 315-324.

Thirty-three copper alloys, containing small amounts of 14 different admixtures were investigated. Composition versus heat resistance diagrams (or composition versus prolonged hardness) experience a principal change with increasing temperature.
(Q-general, 2-60, 2-62; Cu-b)

1049-Q. (Russian.) **Procedure for Drawing the Strength Curves for High-Strength Steels Under Conditions of General Nonuniform Compression.** M. L. Gorb. *Sbornik Trudov Instituta Stroitel'noi Mekhaniki, Akademiia Nauk USSR,* no. 22, 1956, p. 35-55.

New procedure for dealing with experimental research data by deriving relationships from which strength curves can be drawn according to data of an indicator curve on compression (stress-deformation), strength curves for the ring and friction conditions at the ends. From a comparison of the strength curves for different systems of heat treatment it was found that cold working of ShKh15 steel after tempering (in liquid O_2, 15 min.) raises its resistance to relatively low elasto-plastic deformation and considerably lowers its capacity for increasing in strength on extensive plastic deformation.
(Q27a, Q24; ST)

1050-Q. (Russian.) **Effect of Work Hardening Edge Samples of Cold Rolled Transformer Steel on Its Electromagnetic Characteristics.** A. I. Belyakov. *Stal',* no. 2, 1957, p. 185-187.

As a result of heavy cold rolling of transformer steel the edge strips acquire high hardness which lowers its electromagnetic characteristics. To remove work hardening, annealing at 750-850° C. is helpful, since this lowers the specific losses by 15-20% and increases its magnetic induction by 100-400 gauss. Before using such annealing only 28% of samples from sheets 0.50 mm. thick (steel E330) and about 70% of samples from sheets 0.35 mm. thick satisfied normal standards; as after annealing, the quantity of samples which satisfied the standard increased to 98% for sheets 0.50 mm. thick and to 100% for 0.35 mm. thickness.
(Q23a, P16, 2-64; ST, SGA-n)

1051-Q. (Russian.) **Causes of the Unsatisfactory Ductility of Iron-Chromium-Aluminum Resistance Alloys.** A. P. Boiarinova and S. I. Malov. *Stal',* v. 17, no. 3, p. 280.

Presence of a large amount of alumina in Fe-Cr-Al resistance alloys of the 1Kh25Yu5 and OKh25Yu5 types is one reason for their unsatisfactory ductility. Having high hardness (600 BHN) alumina inclusions in drawing can cut the comparatively soft parent alloy (217 BHN) so that there are frequent breaks when wire of these alloys is drawn. To lower the amount

of alumina in such alloys 0.3-0.5% Ti or Zr is introduced. Nitrides formed by this treatment do not impair the ductility of the alloys in wiredrawing.
(Q23p, F28; Fe, Cr, Al)

1052-Q. (Russian.) **Study of Sheet Steel for Reservoir Tanks.** R. I. Duda, L. S. Livshits, V. D. Taran and A. S. Fal'kvich. *Stroitel'stvo Predpriyatii Neftyanoi Promyshlennosti,* no. 1, 1957, p. 13-16.

New method of testing steel to brittle destruction at low temperatures shows the high quality of steel MST. 3 of improved deoxidation and of low-alloy manganese steel. Other tests imitate the working of steel for tanks in the process of the deformation and breakdown caused by the rolls. Welded joints and areas around the joints in both steels have strength equal to that of the main body of the metal.
(Q27a, Q26s; ST, 4-53)

1053-Q. (Russian.) **Effect of Protective Coatings on the Fatigue Resistance of Steel 18 KhNVA.** G. V. Kurganov, A. S. Nikishov, L. P. Rink and N. I. Yartemskaya. *Tekhnologia Transportnogo Mashinostroenia,* no. 2, 1957, p. 29-32.

Chromium and phosphate coatings were tested at 450° C.; coatings of Zn, Cd, oxides and Sn at 250° C. Short trials to destruction and fatigue points were carried out at room and higher temperatures. Tinned test pieces show some loss of strength at 250° C. Electrolytic Cr plating of steel reduces its cyclical strength by 15-17%, both at room and higher temperatures.
(Q7a; AY, 8)

1054-Q. (Russian.) **Effect of Zirconium, Titanium and Aluminum on the "Pressure" Effect in Aluminum Alloys.** S. M. Voronov, V. M. Elagin and L. M. Gladshtein. *Trudy Moskovskogo Aviatsionnogo Tekhnologicheskogo Instituta,* no. 30, 1956, p. 36-59.

Pressure effect in an Al-Zr alloy, and the effects of Zr on the properties of the industrial alloy Avial (Al-Mg-Si); also effects of V and Ti. Seven alloys with 0.1-5% of Zr and V and five with 0.1-1.0% of Ti were prepared. Curves are plotted for the effects of Zr, V and Ti on the mechanical properties of Avial pressed, quenched from 490-530° C. and aged. It has been confirmed that the pressure effect can appear in Al alloys containing Zr, Ti and V, and that the pressure effect in Al-Zr alloys is due to the decomposition of a solid solution, formed in casting, during working the ingot.
(Q-general, 3-74, 2-60; Al-b, *Zr, Ti*)

1055-Q. (Russian.) **Effect of Small Amounts of Titanium and Vanadium on the Properties of Zinciferous Silumin.** G. I. Pogodin-Alekseev, N. A. Solov'ev and A. S. Broido. *Tsvetnye Metally,* no. 1, 1956, p. 66-72.

Presence of 0.1-0.2% Ti, V, Zr in Zn-containing silumin (Alpax) improves the mechanical properties and corrosion-resistance; alloy has good casting properties, and gives high resistance to impairment of its properties by long-period and cyclic heating. Effect of up to 0.7% Ti and V on the properties of Al-Zn-Si alloys containing up to 15% Si and 20% Zn. Metallographic study showed that up to 0.1% Ti and V refines the grain and increases the uniformity of eutectic distribution.
(Q-general, R-general, 2-60; Zn-b, *Ti, V, Zn*)

1056-Q. (Russian.) **Approximate Values for the Yield Point Rate Coefficient for Hot Worked Metals.** L. I. Perlin. *Tsvetnye Metally,* no. 8, 1956, p. 71-72.

To determine the rate coefficient which is a function of normal and tangential true stresses, use is made of the facts that the strain hardening of any metal is proportional to a fractional power of the strain; if hot working lasts long enough the tensile strength of the strain-hardened metal is about 2½ times that of the non-strain-hardened metal; recrystallization in which all lattice distortions are eliminated lasts up to 10 sec. A table of rate coefficients at the recrystallization temperature is given, with evaluations of the accuracy of analytical calculations of the working stresses. Calculated values of the yield points for repeated and continuous processes are reported. (Q23b)

1057-Q. (Russian.) **Determination of the Endurance of Steel Subjected to Repeated Tensile Shock.** L. T. Timoshuk. *Zavodskaya Laboratoriya,* v. 22, no. 12, 1956, p. 1487-1489.

To measure the force exerted on it during a tensile shock, the upper end of the specimen is allowed to act on a piezo-electric transducer,

whose signal at the moment of shock is recorded by a cathode-ray oscillograph. Steels 50 and 40Kh-NMA were subjected to repeated equal high tensile shocks and to alternating high and weak shocks. Steels having similar static mechancial characteristics may differ strongly in their reaction to repeated tensile shocks; repeated application of unequal tensile shocks increases the endurance of steel above that observed for repeated applications of the same high tensile shock X which can be regarded as caused by a "conditioning" of the steel by the intermediate low-value tensile shocks. (Q6p, Q27a; ST)

1058-Q. (Russian.) **Method of Determining Mechanical Properties of Metals in Torsion.** N. G. Mikhailichenko. *Zavodskaya Laboratoriya,* v. 23, no. 1, 1957, p. 83-87.

It is possible to determine all the principal mechanical properties of metals directly from automatically recorded torsion curves with an electrical method of strain measurement. Determination of proportionality limit, yield point and shear strength, and also relative and true shear. The lower peak on the curve of torque against relative twist angle depends little on the shape of the specimen and is a very important practical characteristic of the strength properties of a material. (Q1, 1-54)

1059-Q. Damping of Vibrations in Joints of Machine Parts. D. N. Reshetov and Z. M. Levina. *Vestnik Mashinostroeniya,* v. 36, no. 12, 1956, p. 3-13. (Henry Brutcher, Altadena, Calif., Translation no. 4238.)

(Q8, X28m)

1060-Q. Analysis and Application of Certain Creep Criteria. I. A. Oding and V. S. Ivanova. *Vestnik Mashinostroeniya,* v. 35, no. 5, 1955, p. 62-66. (Henry Brutcher, Altadena, Calif., Translation no. 4211.)

Previously abstracted from original. See item 652-Q, 1955. (Q3; ST)

1061-Q. Creep Ductility Criterion for Metals. V. S. Ivanova. *Zavodskaya Laboratoriya,* v. 21, no. 2, 1955, p. 212-216. (Henry Brutcher, Altadena, Calif., Translation no. 4210.)

(Q3)

1062-Q. (Russian.) **Computation of Diagrams for the True Strain of Cold Worked Metals.** G. P. Zaitsev. *Fizika Metallov i Metallovedenie,* v. 5, no. 3, 1957, p. 484-492.

7 ref. (Q25n, 3-68)

1063-Q. (Russian.) **Strengthening of Carbon Steel Wire Produced From Patented Billets.** K. D. Potemkin. *Stal',* v. 18, July 1958, p. 654-659.

Formula for determining tensile strength of wire subjected to deformation. 6 ref. (Q27a, 2-64; ST, 4-61)

1064-Q. (Book.) **Tentative Guide for Fatigue Testing and the Statistical Analysis of Fatigue Data.** 90 p. 1958. American Society for Testing Materials, Special Technical Publication, STP 9-A, 1916 Race St., Philadelphia 3, Pa. $3.75.

Definitions of statistical terms; purposes of fatigue tests; definitions of test procedures; selection of test specimens and analysis of fatigue data. (Q7, S12)

1065-Q.* Constitutional Factors Affecting the Tensile Properties of Wrought Aluminum-Magnesium-Silicon-Copper Alloys. D. L. W. Collins. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 325-336.

Tensile properties of solution treated and artificially aged alloys within the range 0.5 to 2.0% Mg, 0.3 to 1.2% Si and 0 to 1.5% Cu, related to equilibrium reactions at heat treatment temperatures. An isotherm for the Al-Mg-Si-Cu system at 520° C. is derived. Close correlation was found between mechanical properties and constitution, in particular the solid-solution composition when quenched. 18 ref. (Q27a, 2-60, 2-64; Al-b, *Mg, Si, Cu*)

1066-Q.* Ductile Fracture Instability in Shear. F. A. McClintock. *American Society of Mechanical Engineers, Paper no. 58-A-12,* 1958, 7 p.

Theory to predict when cracking will initiate from a notch at nominal shear stresses below the yield stress; when the crack will become unstable on increase of stress; when unstable cracking will occur if a notch is cut while a constant nominal stress is maintained. (Q25, Q2)

1067-Q.* A Theory of Elastic, Plastic, and Creep Deformation of an Initially Isotropic Material Showing Anisotropic Strain-Hardening, Creep Recovery, and Secondary Creep. J. F. Besseling. *American Society of Mechanical Engineers, Paper no. 58-APM-17,* 1958, 8 p.

If the condition is imposed that all subelements of an element of volume are subjected to the same total strain, it is demonstrated that the inelastic stress-strain relations of the material show anisotropic strain hardening, creep recovery and primary and secondary creep due to the nonuniform energy dissipation in deformation of the subelements. 10 ref. (Q3, Q21, Q24)

1068-Q. Prediction of Transition Temperature in a Notched Bar Impact Test. J. R. Hendrickson, D. S. Wood and D. S. Clark. *American Society for Metals, Transactions,* Preprint no. 96, 13 p.

Concepts of the mechanism of the initiation of brittle fracture in mild steel were previously developed employing notched tensile specimens subjected to rapid loading at different temperatures. These concepts are now applied to obtain a prediction of the transition temperature as determined in the standard Izod impact test. The predicted transition temperature is found to agree remarkably well with the experimental value. 13 ref.
(Q23r, Q26s, Q6; CN)

1069-Q. The Effect of Composition on the Hydrogen Embrittlement of Alpha-Beta Titanium Alloys. R. I. Jaffee and D. N. Williams. *American Society for Metals, Transactions,* Preprint no. 98, 21 p.

Variables investigated were kind and amount of beta stabilizer; combinations of beta stabilizers; presence of Al or Sn, and interstitial level. The susceptibility to hydrogen embrittlement decreased as the amount of beta stabilizer (per cent of beta) and Al increased, but became greater as the oxygen content increased. Mo was the most effective beta stabilizer, and Fe and Mn the least. 10 ref.
(Q26s, 2-60; Ti-b)

1070-Q. 5% Chromium Ultra-High Strength Steel. John C. Hamaker. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 1-15.

A 5% Cr air hardening steel appears to be the best presently available for either ultra-high strength applications at room or low temperatures, or for elevated-temperature stability to 1000° F. In the 220,000-300,000-psi. tensile range, this steel provides significantly higher impact strength and ductility than low-alloy steels, and 20-35% higher fatigue strength than any air melted material previously reported. From 400-1000° F., its strength-to-weight ratio surpasses all materials including heat treated Ti alloys. 17 ref.
(Q-general, T24; AY, *Cr,* SGB-a)

1071-Q. Embrittlement of High Strength Steels. E. P. Klier. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 53-67.

Over-all problem of fracture in high-strength steels consists in establishing the conditions under which critical-sized fracture nuclei are generated and the load conditions under which the nuclei are converted into free running cracks. It is possible that microstresses are important in determining nucleation of a crack depending on their sign. 15 ref.
(Q26s; ST, SGB-a)

1072-Q. Acceptance Testing of High Strength Steels. Seymour Goodman. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 69-76.

Four high-strength steels in widespread use are SAE 4340, SAE 4330, HS-220 and Hy-Tuf. Still higher strength steels have been developed, including Tricent, Super Tricent, U. S. S. Strux and Hi-C-Super Hy-Tuf. Tests outlined include creep, short-time hot tensile and stability tests. (Q27a, Q3, 1-54; AY, SGB-a)

1073-Q. Properties and Application of 17-7 PH and Other Precipitation Hardening Stainless Steel Sheet for Airframes. R. W. White. Paper from "Sheet Materials for High Temperature Service", American Society for Metals, 1958, p. 1-9.

Typical tensile strengths of the 17-7 PH, PH 15-7 Mo, and AM-350 in the subzero cooled and tempered conditions. The creep properties of PH 15-7 Mo are superior to those of the original composition. AM-355 also has superior creep strength to AM-350. Applications include stringers, ribs, bulkheads, shrouds, honeycombs and skins. 3 ref.
(Q-general, 17-57, T24a; SS)

1074-Q. High Alloys of Chromium, Cobalt, Columbium, Molybdenum and Vanadium. H. R. Ogden. Paper from "Sheet Materials for High Temperature Service", American Society for Metals, 1958, p. 11-23.

Presently available V-base alloys will be useful up to about 1300° F., Co-base alloys up to about 1800° F.,

and Mo-base alloys up to about 2200° F. The limited data on Cr-base alloys indicate that they should have structural strength up to about 1800-1900° F. Co exhibits useful strengths at temperatures at least to 1800° F. 29 ref.
(Q-general, 2-62; V, Co, Mo, Cb, Cr, 4-53)

1075-Q. Relationship Between Surface Condition, Friction and Wear. F. T. Barwell. Paper from "Effect of Surface on the Behaviour of Metals", Philosophical Library, 1958, p. 43-68.

Nature of friction or contact; effect of naturally occurring oxide films; effect of temperature; fretting corrosion; pitting-type failure; scuffing. Nature of the oxide film and its relationship to its substrate. 28 ref. (Q9, R1f)

1076-Q. The Effect of Copper, Nickel, Iron and Chromium on the Tensile Properties of Preferentially Oriented Beryllium Sheet. F. M. Yans, A. D. Donaldson and A. R. Kaufman. *U. S. Atomic Energy Commission, NMI-1192,* 1958, 41 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Beryllium was mixed with Cu, Ni, Fe and Cr to form binary alloys in powder form, then extruded and cross rolled. The effect of each alloying element was determined by tensile testing. In solid solution, small amounts of Fe and Ni had an embrittling effect, while Cu in solution increased the strength but had no effect on ductility. The effect of Cr was complicated and not readily explainable. 6 ref.
(Q27a, 2-60; Be, 4-53, *Cu, Ni, Fe, Cr*)

1077-Q. (Russian.) **Problem of Plastic Deformation and Strengthening in a Sign Reversing Deformation.** F. P. Rybalko. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 376-377.

Hollow single and polycrystalline cylinders of Cu, subjected to sign-reversing torsion in strictly symmetrical cycles, experience an unequally deformed plastic deformation, during which various parts of the specimen are deformed and strengthened not simultaneously, but in sequence. The distribution of deformation along the specimen was determined from the twist angles of scribe marks drawn before the test parallel to the generatrix of the cylinder, and also from the appearance of sharply bounded regions of different shade on the surface of the specimen. The cause of such a separation of cylinders into regions is in this case, the different degree of deformation and strengthening of the middle and extreme parts of the specimens. (Q1, Q24; Cu)

1078-Q. (Russian.) **Coefficient of Transverse Deformation in the Plastic Region.** A. V. Gur'ev. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 457-463.

Coefficient determined for structural steel. In plastic tension, even for a round specimen, the deformation occurs in an extremely irregular manner over its volume. Compared with other investigations, a value of the coefficient that is closer to 0.5 was obtained.
(Q24; ST, SGB-s)

1079-Q. (Russian.) **Structure of the Slippage Tracks on the Surface of Deformed Aluminum Alloys.** N. N. Buynov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 477-483.

Electron microscope investigation of hardened Al-Cu (4% Cu), Al-Si (1.2% Si) and Al-Mg-Si (1.4% Mg_2Si) alloys. Each elementary slippage track corresponds to a slippage over a packet of atom planes. The shear over these planes is not distributed uniformly. The degree of localization of the deformation in the slippage tracks is different in different sections of the alloy.
(Q24c; Al-b)

1080-Q. (Russian.) **Problem of the Effect of Lubricating Media on the Process of Penetration of a Sharpened Indentor Into a Plastic Metal.** V. D. Kuznetsov and A. I. Loskutov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 509-513.

Effect of lubricants on the measurement of microhardness of commercially pure Fe, Cu and Zn. Measurements were carried out dry and with vaseline (inactive media), and also in 0.2% solutions of olein and stearine acids in vaseline oil (active media). The loading range was from 20 g. to 4 kg. Curves of the "depth of indentor penetration versus load" were plotted for each medium. Curves without lubricant and with vaseline-oil lubricants are identical.
(Q29q; Fe, Cu, Zn, NM-h)

1081-Q. (Russian.) **Fragmentation of the Surface of Polycrystalline Metals in Sign-Reversing Torsion.** F. P. Rybalko. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 514-520.

Various frequencies of sign reversals in the deformation and deformation amplitudes per cycle have been employed. Many polycrystalline metals, such as Cu, brass, Al, Pb, Sn and Zn with their alloys with Al have been used to establish that in case of viscous failure, regardless of the frequency of sign reversal and of the value of the deformation amplitude during the cycle, the surface of the specimens is fragmented by macrocracks into a system of rectangular blocks, the sides of which are directed along the planes of the maximum cleavage stresses. (Q1, Q26n, Q24)

1082-Q. (Russian.) **Strengthening of Aluminum and Magnesium-Base Alloys by Triple Metallic Compounds.** B. K. Vul'f and N. P. Shekalov. *Izvestiia Sektora Fiziko Khimicheskogo Analiza Institut Obshchei i Neorganicheskoi Khimii imeni Akademii Nauk SSSR,* v. 27, 1956, p. 198-208.

Investigation of Al-Cu-Mg, Al-Mg-Zn, Al-Cu-Ni, Al-Cu-Mn, Al-Mn-Ni, Mg-Cu-Zn, Mg-Ca-Zn, Mg-Al-Li alloys. Addition of triple metallic compounds in cast Al and pressed Mg alloys increases their hardness and strength. Plasticity of the alloy diminishes with increasing content of the triple compound. In hard Ag or Mg the hardness of the heat treated alloys increases upon aging. Good mechanical properties were exhibited by alloys of Al with 7.5% Al-Cu-Mg. The greatest strength was obtained for a Mg alloy with 19.4% Al_2MgLi.
(Q27a, Q29n; Al-b, Mg-b)

1083-Q. (Russian.) **Effect of Alloying Elements on the Temper Brittleness of Structural Steels.** V. I. Prosvirin and Ye. I. Kvashinina. *Termicheskaya Obrabotka i Svoystva Litoy Stali. M., Mashgiz,* 1955, p. 69-87.

Addition of Mo up to 0.5% prevents development of processes that cause temper brittleness in structural Cr-Ni-Mo and Cr-Mn-Mo steels. Greater additions of Mo (1% and above) do not affect the temper brittleness. Addition of tungsten (up to 1.6% for the 35KhGV steel) strongly retards the development of temper brittleness in structural steels. Additions of Ti, V and Cb do not prevent the development of temper brittleness.
(Q26s, 2-60; AY, SGB-a)

1084-Q. (Russian.) **Causes of Large Plastic Deformations in the Stretching of Metal Samples With Annular Grooves.** Yu I. Likhachev. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 8, 1956, p. 1841-1848.

Investigation of the boundaries of plastic regions constructed as the first approximation of the elastic-solution method on the basis of the Neiber solution has shown that large plastic deformations appear long before fracture in the elasto-plastic deformation stage of grooved plastic metal samples, because the plastic deformation region penetrates to the axis of the sample on both sides of the smallest groove cross section, and a closed plastic region containing the elasto-deformed nucleus is formed. (Q24)

1085-Q. Material-Property-Design Criteria for Metals: Pt. 6. The Conventional Short-Time Elevated-Temperature Properties of Selected Light Alloys. W. P. Achbach, R. J. Favor and W. S. Hyler. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131515, Oct. 1957, 259 p. $6.

Data on alloys applicable to airframe and missile fabrication—2014-T4 and T-6; 2024-T3, T4, T6, T36, T81, and T86; 2218-T61; X2219-T6; 7075-T6 Al alloys; HK31A-T6 and HK31A-H24 Mg alloys; and Ti (8Mn) Ti alloy.
(Q-general, 2-62, T24; Al, Mg, Ti)

1086-Q. A Study of the Possibility of Reinforcing High-Temperature Alloys by Addition of Refractory Powders. J. D. Burney. P. R. Mallory & Co., Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131768, Feb. 1958, 48 p. $1.25.

Introduction of carbon to 80-20 Ni-Cr alloy forms a liquid phase in sintering which results in a high-density material having superior stress-rupture characteristics. Mere presence of carbon in the alloy does not insure the same increased stress-rupture properties. This indicates that the superior characteristics are indirectly due to a unique processing technique.
(Q3m, H12q; Ni, Cr, SGA-h)

1087-Q.* (French.) **Fatigue Testing of Welded Joints in Tubes and Plates.** W. Soete and J. Strebelle. *Revue de la Soudure,* v. 14, no. 2, 1958, p. 81-90.

Radiographic examination of a crane under construction was not

sufficient to determine quality of the welded joints, constructed from flattened tube ends and plates. Fatigue tests show that the repeated tensile strength of the assemblies was around 3.8 kg./per sq. mm. When a 1.5 security factor was used, the calculated compression did not exceed 2.53 kg./per sq. mm. Radiographic examination was restricted to detection of large imperfections. Weakness was primarily due to the unusual form of the piece. (Q7, S13e; ST, 7-51)

1088-Q. (Hungarian.) **Selection of the Proper Steel Type.** I. Mester. *Muszaki Elet,* v. 11, no. 8, 1956, p. 10-13.

Use of different types of steel and the effect of oxygen, nitrogen, hydrogen and alloying elements on properties. (Q-general, 17-57; ST)

1089-Q.* (Japanese.) **Hardness Tests.** Misao Mashimo. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 31-34.

Typical devices recommended by Japanese Industrial Standards. 4 ref. (Q29, 1-53; ST, 8-62)

1090-Q.* (Japanese.) **Case Hardness Tests.** Eiichi Takeuchi. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 35-38.

Physical methods are most efficient. Surface to be measured is prepared by polishing. Chemical methods are useful in measuring case depth. Microscopy is also helpful. (Q29, 1-54; ST, 2-64)

1091-Q. (Russian.) **Structural Features of Brittle and Viscous Fractures in Steel.** B. S. Kasalkin and B. A. Movchan. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, 1956, p. 151-153.

X-ray structural analysis method was used to study brittle and viscous fractures in specimens made of NL2 and BSt3 steel with a substantial difference in sensitivity and cold brittleness. X-rays indicate that in the case of viscous failure the degree of reduction of the initial grains on the fracture surface exceeded the degree of reduction in brittle failure. Propagation of plastic deformation under conditions of brittle damage is determined. Results confirm that in spite of the visible difference in the character of the fracture, brittle and viscous failure are accompanied by a process of breaking down of the initial grains and a strengthening that is characteristic of plastic deformation. (Q26s, 3-68)

1092-Q.* On the Orientation Effect in the Polygonization of Bent Silicon Crystals. F. L. Vogel. *Acta Metallurgica,* v. 6, Aug. 1958, p. 532-534.

Experiments show that polygonization can readily occur in regions of a bent crystal where the deformation is primarily by single slip. By contrast, when slip on intersecting systems allows the formation of Lomer-Cottrell barriers, polygonization is absent. Thus explicit experimental evidence for the formation and immobility of Lomer-Cottrell barriers is obtained. 5 ref. (Q24a, M26c; Si)

1093-Q.* Dislocation Theory of the Fracture of Crystals. F. E. Fujita. *Acta Metallurgica,* v. 6, Aug. 1958, p. 543-551.

Mechanism for fracture is calculated with the theory of dislocation in elasticity and strain energy method. The calculation shows that a long flat void packed with a certain number of dislocations will be able to grow to be a large crack causing fracture, even if it is sufficiently small to be a stable crack in the crystal—for instance, a few atomic spacings in thickness and a few hundred atomic spacings in length in one dimension. 14 ref. (Q26r, M26b)

1094-Q.* Properties of Some Tungsten and Titanium Steels Containing Boron. A. Banerjee, D. K. Sood and P. Mehta. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 143-160.

Effect of boron on the properties of low-carbon, low-alloy steels; influence of 0.5% Mo on steels containing 0.005% B; similarity in the effects of Mo, W and Ti in B treated steels; precipitation hardening in Mo-B steels; weldability of B steels. 25 ref. (Q-general, 2-60, K9s; AY, *Mo, W, Ti, B*)

1095-Q.* Temperature Dependence of Young's Modulus in Plain Carbon Steels. B. N. Das and S. K. Banerjee. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 195-206.

Young's modulus of plain carbon steels with up to 1% C at room temperature falls into a narrow range of approximately 30.4 to 30.7 $\times$ 10^6 psi. In general there

is a trend of gradual increase with increase in carbon content, but Mn seems to have a larger effect. 4 ref. (Q21a, 2-61; CN)

1096-Q.* Titanium at Temperature. H. R. Ogden. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. B2-B4.

Mechanical properties, thermal stability, oxidation and contamination resistance. (Q-general, 2-62; Ti)

1097-Q.* High-Strength Aluminum Alloy. Alan B. DeRoss. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. B6-B7.

Decrease in Fe content improves properties of Al casting alloy 356, permitting selection of a combination of properties suitable for structural parts. Q-general, 2-60; Al-b, SGB-a, SGB-s)

1098-Q.* Designing With PH Steels. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. B8-B11.

Applicable to 1200° F., precipitation hardening steels are affected by chemistry and heat treating variables. Brazing and welding precautions, mechanical and chemical properties. (Q-general, 17-51; SS)

1099-Q.* Ultra-Strength Steels. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. B13-B15.

Properties, composition, heat treatment, available forms, applications of AISI E 4340, AMS 6427 B, AMS 6428, Tricent, 5-317, Hy-Tuf, UHS 260, La Belle HT, HS 220, HS 260, Strux steels.
(Q-general, 17-57; AY, SGB-s)

1100-Q.* Pearlitic Malleable Castings. O. K. Hunsaker. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. D7.

Readily cast, easily machined, with 45,000 to 80,000 psi. yield strength and 60,000 to 100,000 psi. ultimate tensile strength, pearlitic malleable can be hardened to Rockwell C-62. (Q27a, Q29n; CI-s)

1101-Q.* (French.) **Low-Temperature Internal Pressure Tests on Tubular Specimens.** Alfred Krisch. *Revue de Metallurgie,* v. 55, June 1958, p. 555-561.

Internal pressure tests combined with longitudinal stress at temperatures of 20, -30 and -70° C. on tubular specimens in two basic bessemer steels of different N and Al contents in annealed and in artificially aged conditions. With lowering of temperature, both steels showed decrease in deformation upon fracture. Specimens with low N content stretched prior to breaking. Elastic limit and tensile strength increased at low temperatures. Tests gave evidence of sharp differences between steels tested when subjected to biaxial stresses. Results were compared with results of tensile tests on cylindrical specimens. 8 ref.
(Q21, Q27, Q10, 3-74; ST, *Al, N*)

1102-Q.* (French.) **Study of Laws of the Fatigue Process in Metals.** V. S. Ivanova. *Revue de Metallurgie,* v. 55, June 1958, p. 562-566.

Fatigue diagram is proposed according to which fatigue process is regarded as consisting of three periods: incubation, adaptation (during which slip occurs), and cracking. Method for experimental determination of length of each period permits construction of detailed fatigue diagrams of polycrystalline metals of polyhedric structure and establishment of laws of formation of cracks both within grain and at boundaries. For Armco Fe and Cu ratio of number of cycles causing appearance of adaptation (slip) lines within grains to number of cycles resulting in destruction of specimen has, for each metal, a constant value which is independent of stress. Diagrams for these two metals. 10 ref. (Q7; Fe, Cu)

1103-Q.* (French.) **Fatigue Phenomena During Combined Rolling and Slip.** A. G. Nikonoff. *Revue de Metallurgie,* v. 55, June 1958, p. 567-572.

Laboratory production of fatigue cracks and hardened layer that forms before appearance of cracks resulting from severe braking conditions in railroad car wheels. Fatigue tests on carbon and low-alloy steel specimens taken from wheels and treated by method described showed that the higher the mechanical properties, the finer the grain and the greater the quantity of lamellar structures in the metal, the slower is the formation of fatigue cracks. Increase in C content and proper heat treatment can provide these desirable properties. The hardest and most brittle surface layer forms on specimens with high carbon content, critical points at fairly low temperatures and low critical cooling rate. Mechanical properties do not appear to exert any great influence on cracks

caused by braking stresses. Low-carbon steel (to 0.6% C) or low-alloy steel with up to 0.5% C, suitably heat treated, is recommended for wheels subject to severe braking. 6 ref. (Q7, T23; ST)

1104-Q.* (French.) **Initial Results of Research on the Hot Deformation of Steels. Application of a Specially Designed Apparatus.** C. Rossard and P. Blain. *Revue de Metallurgie,* v. 55, June 1958, p. 573-594.

Results of hot torsion tests on several types of steel at speeds ranging from 1 to 1000 rpm. and temperatures of 900 to 1200° C. For a given speed of deformation and a given temperature, stress attains a constant value, independent of deformation, only after a transitory period of damped oscillations, this period being characteristic of the given steel. These transitory periods are associated with phenomena of recrystallization which give rise to very different structures according to speed of deformation and temperature. A law of variation of characteristic stress as a function of deformation and temperature is deduced. Test equipment described. 20 ref.
(Q1, 1-66, 1-53; ST)

1105-Q.* (French.) **Method of Graphical Determination of Transitory Phenomena During Hot Deformation of Steels.** C. Rossard and P. Blain. *Revue de Metallurgie,* v. 55, June 1958, p. 595-598.

Since in industrial processes correct rate of deformation often varies significantly with deformation, and since, for a given degree of deformation, stress under which hot deformation occurs depends not only on temperature, deformation and rate of deformation, but also on previous history of the metal, a method of graphical calculation is proposed which permits determination, on basis of a series of stress-deformation curves obtained at constant speed of stress variation as a function of deformation for any law of speed of deformation. 3 ref.
(Q24, 1-54, Q25n)

1106-Q. (Russian.) **Mechanism of Plastic Deformation and Mechanical Properties of Aluminum. Pt. 2. Block Formation in Grains of Aluminum During Plastic Deformation.** E. S. Yakovleva. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 145-150.

Disoriented regions are formed in the grains during plastic deformation. Size and degree of disorientation of the resultant regions are not the same, if the conditions of deformation of the specimens are different. At low temperatures, these regions are made up by weakly disoriented small blocks. The total angle of disorientation of the blocks at 2% tension does not exceed 1° C. As the deformation increases, the disorientation angle increases, and the size of the blocks decreases. At 18% tension, the size of the block reaches an order of 10^{-4} cm. (Q24, M26c; Al)

1107-Q. (Rumanian.) **Investigation of Properties of Low-Alloy Manganese-Molybdenum Structural Steel.** B. Rotenstein. *Studii si Cercetari Metalurgie,* v. 11, no. 2, 1956, p. 261-282.

Influence of Mn, Cr, Mo, Cu and C on tension properties, impact, subzero properties, hardenability, susceptibility to reversible temper brittleness, sensitivity to thermal welding cycle and corrosion stability. Low-alloy Mn-Mo steel with small additions of Cu and Si can be used to make machine parts as a substitute for Cr-Ni steels or Cr-Mo steels, and also for structural and shipbuilding material.
(Q-general, 2-60; AY, *Mn, Mo*)

1108-Q. (Russian.) **Brittleness of Chromium.** S. T. Kishkin and I. O. Panasyuk. *Doklady Akademii Nauk, SSSR,* v. 113, no. 6, 1957, p. 1263-1264.

Threshold of cold brittleness of Cr is substantially affected by various gases. Oxygen, both dissolved and bound, increases brittleness at normal temperature. The most harmful impurity among the elements that form solid solutions is nitrogen. Purification of the metal should lead to reduction in the cold brittleness.
(Q26s, 2-63, 3-69; Cr, *O, N*)

1109-Q. (Russian.) **Relaxation of Stresses in Alloys of Aluminum With Magnesium.** M. G. Gaydukov and U. A. Pavlov. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 123-130.

Relaxation of stresses in temperature range from 100 to 300° C. with initial stresses of 300 g. per sq. mm. Increase in the relaxation stability

of Al-Mg alloys, compared with pure Al is connected not with increase in the interatomic binding forces but with increase in the effectiveness of the binding forces. This is due to two factors; first, as the number of distortions increases, internal stresses are more uniformly distributed over the volume of the crystal; second, during diffusion, relaxation of stresses takes place near the regularities of the crystalline lattice, and a reduction in the degree of overstress takes place around them.
(Q3s, Q25h, M25h; Al-b, *Mg*)

1110-Q. (Russian.) **Concerning the Brittleness of Metal-Like Compounds.** V. S. Neshpor and G. V. Samsonov. *Fizika Metallov i Metallovedenie,* v. 4, no. 1, 1957, p. 181-183.

Coefficient of linear expansion of certain carbides, nitrides and borides of W, Mo, Ti and Zr determined, with their moduli of elasticity. On the basis of these quantities, the mean-squared displacements of the molecules of the corresponding compounds from their equilibrium positions in the crystalline lattice are calculated for the propagation of elastic waves. (Q26s, Q21, P10d; W, Mo, Ti, Zr, 14-68)

1111-Q.* Friction and Wear of Metals to 1000° C. E. P. Kingsbury and E. Rabinowicz. *American Society of Mechanical Engineers, Transactions,* Paper no. 58-LUB-6, 1958, 4 p.

Sliding experiments on Zn, Cu, Ti and 1020 steel carried out on a pin-on-disk friction apparatus incorporated in a metallurgical furnace. At room temperatures the results with steel, but not with the other metals, depended markedly on the atmospheric moisture content. As temperatures were raised to 400° C. the friction and wear rate of the steel reached a maximum at 100° C. and then diminished, while with the other metals the friction remained constant and the wear rate increased. 15 ref.
(Q9, 2-62; Zn, Cu, Ti, CN)

1112-Q.* Strength of Welded Joints in Low-Alloy Steels at Elevated Temperatures. W. B. Hoyt. *American Society of Mechanical Engineers,* Paper no. 58-PET-34, 1958, 15 p.

Short-time tensile and creep-rupture tests on steels with 1% Cr, ½% Mo, and 2¼% Cr, 1% Mo.
(Q27a, 2-62, Q3m; AY, *Cr, Mo,* 7-51)

1113-Q.* First All-Beta Titanium Alloy Has Strength of 240,000 Psi. *Materials in Design Engineering,* v. 48, Sept. 1958, p. 131-132, 134, 136.

Development by Crucible Steel Co. of three new high-strength Ti alloys. One, believed to be the first all-beta Ti alloy ever produced, can be heat treated to a tensile strength of 240,000 psi. and has excellent formability. The other two, available in sheet form, can be solution treated to a soft, easily formed condition and then aged to high room and elevated-temperature strength.
(Q27a, Q23q; Ti-b)

1114-Q.* High Strength Aluminum Alloy X357—Properties and Aging Practices. Alan B. DeRoss. *Modern Castings,* v. 34, Sept. 1958, p. 82-85.

Heat treating practices and mechanical properties; yield strength in the range of 43,000 psi. and ultimate strength above 50,000 psi. Exhibits castability, machinability, dimensional stability and corrosion resistance.
(Q-general, J27d; Al-b, 5-60)

1115-Q. Determination of the Mechanical Properties of Aircraft-Structural Materials at Very High Temperatures After Rapid Heating. J. B. Preston, W. P. Roe and J. R. Kattus. Southern Research Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131664, Jan. 1958, 206 p. $3.

Mechanical properties, tensile, creep, fracture, compression, shear and bending of several aircraft and missile structural materials under conditions of moderate to rapid rates of heating and of loading. Test materials included electrolytic tough-pitch Cu, oxygen-free high-conductivity Cu, A-nickel, ingot iron, Mo, Ta, Type-GBH graphite, and composite OFHC Cu plus 316 stainless steel sheet. Temperature ranges from room to the melting points of the metals and to 5750° F. for the graphite were used, with heating, holding, and loading times to failure ranging from 3 sec. to 30 min. The strength of the metals was found to decrease continuously with increasing temperature.
(Q-general, 2-62, T24, 17-57; Cu, Ni, Fe, Mo, Ta, SS)

1116-Q. Effect of Prior Creep on Mechanical Properties of Aircraft Structural Metals: 2024-T86 Aluminum and 17-7 PH Stainless. J. V. Gluck, H. R. Voorhees and J. W. Freeman. University of Michigan. (Wright Air Development Center.)

U. S. Office of Technical Services, PB 131716, Feb. 1958, p. 115 p. $2.50.

Specimens of 2024-T86 Al alloy and 17-7PH (TH 1050) precipitation hardening stainless steel were exposed for 10 to 100 hr. at stresses giving up to 3% total deformation, using temperatures of 350 to 500° F. for the 2024-T86 and 600 to 900° F. for the 17-7PH. Short-time tensile, compression or tension-impact tests were run at either room temperature, exposure temperature, or both. Results indicated that the short-time strength of structural materials may be raised or lowered. The changes in properties may be as much as 50% of the original value. (Q-general, Q3; Al-b, SS)

1117-Q. Studies and Comparison of the Properties of High-Temperature Alloys Melted and Precision Cast Both in Air and in Vacuum. M. J. Stutzman. Westinghouse Electric Corp. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131807, Mar. 1958, 112 p.

Potentialities for improvement of mechanical properties at elevated temperature of heat resisting alloys by varied practices of melting and investment casting. Two Co-base alloys, Stellite 31 and He 1049, and two Ni-base alloys, Udimet 500 and Guy's alloy, were tested. Effects of melting and casting procedures upon gas content (hydrogen, oxygen, oxygen and nitrogen), tensile properties at room and elevated temperatures, stress-rupture properties in the range 1350 to 1800° F., and oxidation resistance to air at constant temperature of 2000° F. and intermittent exposure to air at room temperature and 2000° F. (Q-general, 2-62, E10; Co, Ni)

1118-Q. Determination of the Mechanical Properties of a High Purity Lead and a 0.058% Copper-Lead Alloy. T. E. Tietz. Stanford Research Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131818, Apr. 1958, 43 p. $1.25.

Mechanical properties of a high-purity Pb and a 0.058% Cu-Pb alloy at test temperatures of 100, 175, 250 and 325° F. Tensile properties evaluated included ultimate strength, elongation, modulus of elasticity, proportional limit and yield strength. Compression properties studied were modulus of elasticity, proportional limit and yield strength. Ultimate shear strength and bearing yield strength and ultimate bearing strength were determined. Stress-creep time curves were obtained for total strain values of 0.2, 0.5, 1.0 and 2.0%, for creep times of from 1 to 500 hr. (Q-general; Pb)

1119-Q.* (Czech.) **Graphs for X-Ray Measurement of Internal Macrostrains.** Miroslav Cermak. *Hutnicke Listy,* v. 13, no. 7, 1958, p. 594-598.

Graphs for determination of internal macrostrain for usual types of back reflection method, especially flat conical and cylindrical cases. 5 ref. (Q25, M22g)

1120-Q.* (German.) **Properties of Zinc-Copper Alloys From Spelter 98.8.** E. Pelzel. *Metall,* v. 12, Aug. 1958, p. 732-735.

For cast alloys, Cu up to 8% is necessary to eliminate coarse grain caused by Pb impurities, and to obtain adequate mechanical properties. At best these alloys are inferior, and use in casting is probably limited. Used as a rolled material, Zn-Cu alloys of a lower Cu content can be given the desired mechanical and technological properties by adequate heat treatment. 10 ref. (Q-general; Zn-b, *Cu, Pb*)

1121-Q.* (German.) **Influence of Vanadium Upon Some Characteristic Properties of Cast Iron.** Gunter Meckler. *Stahl und Eisen,* v. 78, June 26, 1958, p. 900-906.

Vanadium seems to have considerable influence upon structures, tensile strength (up to 450° C.) Brinell and Shore hardness after casting and after annealing at 500 to 800° C. It increases surface hardness and tensile strength, also under elevated temperatures. The actual cause for these property changes is cementite which increases the effect of V. 12 ref. (Q-general; 2-60; CI-q, *V*)

1122-Q. (Russian.) **Softening of Plastically Deformed Metals.** V. N. Daniiov. *Metallovedenie i Obrabotka Metallov,* no. 6, 1957, p. 15-16.

Softening of plastically deformed low-carbon steels (0.03% C), Al and Cu, annealed at temperatures somewhat above the recrystallization temperature, rolled in the middle portion of each specimen and subjected to deformation under stresses of 3, 1.8 and 0.8 kg. per sq. mm. respectively. Value of the thermal emf. between the center and the rolled ends of the specimens and the microhardness in various points

were measured at different temperatures. The greater the deformation of the metal, the faster the softening process.
(Q24, N5; CN, Al, Cu)

1123-Q.* (Russian.) **Relation Between Wear Resistance, Microhardness and Crystal Lattice Distortion of Metals.** Yu. S. Terminasov and P. I. Ignatenko. *Vestnik Mashinostroeniya,* v. 38, Aug. 1958, p. 45-46.

X-ray was used in studying physical aspects. Objects tested for wear resistance in dry state and in oil, using steel ring 48 mm. diameter. Graphic presentation of connection between the surface microhardness and deformation in the crystal lattice shows relationship to be rectilinear. Thus, the greater the distortions in the crystal lattice of the worked-in surfaces the higher its microhardness. (Q9n, Q29q, M26b)

1124-Q.* (Russian.) **Testing Armature Material by Resistance to Scratching.** A. V. Ratner and V. N. Gulyaev. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 770-774.

Tests applied to armatures working at steam pressure of 170-300 atm. and temperature of 560-650°. Test pieces are ground, flat objects approximating size of armature parts (diameter 20-100 mm.). Tests are conducted under steam (pressure about 1 atm.) with diminishing protective action of adsorptive layers and air. 4 ref. (Q29d, W11q)

1125-Q.* **High Temperature Mechanical Properties of the New Magnesium Alloys.** R. E. Bockrath. *Modern Metals,* v. 14, Sept. 1958, p. 52, 54, 56, 58.

Properties of sheet, plate, casting, extrusion alloys, including creep data up to 700-800° F.
(Q-general, 2-62, Q3; Mg-b)

1126-Q. Fretting-Fatigue Failure of Titanium-Steel and Steel-Steel Joints. W. L. Starkey, S. M. Marco and J. A. Collins. *Product Engineering (Design Digest),* v. 29, Sept. 1958, p. F15-F17.

Quantitative evaluation of the fatigue damage caused by fretting Ti against steel. Effects of shot peening and cold rolling as fretting inhibitors. (Q7, Q9q; Ti, ST)

1127-Q. (French.) **Disadvantages of Arc Welding.** J. Daivier. *Revue de la Soudure,* v. 14, no. 2, 1958, p. 119-122.

Experimental fatigue test data, radiographically and macrographically controlled, to determine most suitable welding conditions.
(Q7, K1; ST, 7-51)

1128-Q. (Russian.) **Method for Fatigue Estimation of Conveyor Driving Chains.** I. G. Shtokman and S. I. Lyakhovitskii. *Vestnik Mashinostroeniya,* v. 38, Aug. 1958, p. 23-26. 8 ref. (Q7, W12r; ST)

1129-Q. (Russian.) **Calculation of Tensions in Circular Objects Arising From Creep.** I. A. Oding and G. F. Lenin. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 845-848. 8 ref. (Q3, Q25)

1130-Q. (Russian.) **Study of Plastic Deformation in Circular Objects.** G. F. Lenin. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 849-850. (Q24)

1131-Q. (Russian.) **Determination of Plasticity of Low-Carbon Low-Alloy Steel.** I. A. Andreev, I. T. Baruzdin and L. Ya. Gluskin. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 855-858.

Heat precipitation test of shape changing cylindrical objects. 8 ref. (Q23; AY, 4-60)

1132-Q. (Russian.) **Device for Studying Relaxation of Stress After Torsion.** Ya. S. Gintsburg. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 865-867.
(Q1c, 1-53)

1133-Q. (Russian.) **Device for Studying Metal Friction at High Temperatures.** L. M. Feigin. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 869-870.
(Q9p, 1-53, 2-62)

1134-Q. Cermets as Potential Materials for High-Temperature Service. O. A. Sandven. *Advisory Group for Aeronautical Research and Development,* Rept. 99, Apr. 1957, 6 p.

Review of chemical, physical and mechanical properties of the most important and promising hard metals and cermet systems, with special attention to creep resistance and ductility. Some experimental results on the system CbC-TiC-Ni. (Q-general, P-general; SGA-h, 6-70)

1135-Q. Mechanical and Engineering Properties of Commercially Available Titanium Alloys. *Advisory*

Group for Aeronautical Research and Development, Rept. 100, Apr. 1957, 4 p.

Titanium alloys being produced on a commercial basis up to early 1957. Nominal chemical compositions and manufacturer's designations. Collection of published data on physical, mechanical and engineering properties. Properties required by the aeronautical design engineer that are not available.
(Q-general, S22; Ti-b)

1136-Q. A Survey of the Structural Properties of Some High-Strength Sheet Steels. M. A. Melcon. *Advisory Group for Aeronautical Research and Development,* Rept. 101, Apr. 1957, 12 p.

Developmental of high-strength sheet steels for aircraft applications. Heat treatable stainless steels are 420, 422, 422M, AM350 and 17-7PH; Tri-cent is a low-alloy steel and Thermold "J" a toolsteel. Mechanical properties at room and elevated temperatures; fatigue, creep, and stress-rupture data. Fabrication problems such as welding, machining and distortion during heat treatment. (Q-general, T24, 17-57; AY, SS, SGB-a)

1137-Q. Croloy 15-15N—an Austenitic Heat-Resistant Alloy for Severe Tubular Applications at Elevated Temperatures. J. F. Ewing. *American Society of Mechanical Engineers,* Paper no. 57-A-205, Dec. 1957, 10 p.

Development work and extensive service experience for Croloy 15-15N, an austenitic heat resistant alloy designed with superior long-time strength at elevated temperatures for applications between 1200-1500° F. Strengths established in the 1200-1500° F. range are superior to the established AISI Type 300 series of austenitic heat resistant alloys. Need for proper heat treatment to realize superior strength above 1200° F. for Croloy 15-15N.
(Q27a, 2-62, Q3m, 2-64; SS, SGA-h)

1138-Q.* Relief of Thermal Stresses Through Creep. H. Poritsky and F. A. Fend. *American Society of Mechanical Engineers, Transactions,* Paper no. 58-A-41, 1958, 9 p.

Equations for analyzing effects of thermal creep on stress distributions. In formulating these elasto-plastic equations, the tensile test stress-strain creep data are extended to compound stresses by means of the Mises-Hencky hypothesis. The various equations are manipulated to yield a numerical procedure by means of which the stress and strain components are computed successively at the end of various time intervals. The resulting equations are applied to the axially symmetric problem of relief of thermal stresses in an infinitely long cylinder which is quickly heated to a parabolic temperature, and maintained at that temperature. (Q25p)

1139-Q.* How Radiation Damages Metals. M. J. Makin. *Atomics and Nuclear Energy,* v. 9, Sept. 1958, p. 318-322.

Effect of irradiation on tensile properties of a number of pure metals under various conditions. Very large increases in the yield strength have been observed in initially annealed materials and yield point phenomena have been found in irradiated Cu, Ni, Zr and Fe. The yield stress of pure metals shows only a slight temperature dependence before irradiation whereas, after irradiation, the yield stress is strongly temperature dependent, being much less at higher temperatures. 14 ref.
(Q27a, 2-67; Cu, Ni, Zr, Fe)

1140-Q.* Special Report on Temperature Resisting Mag-Thorium Alloy HK31. *Design News,* v. 13, Sept. 1, 1957, p. 18-19.

Hk31 contains 96.3% Mg, 3% Th and 0.5 to 0.7% Zr. It possesses extraordinary resistance to creep and maintains excellent strength through the temperature range of 300 to 700° F.
(Q3, Q27a, 2-62; Mg-b, *Th*)

1141-Q.* Measurement of Residual Stresses in Alloy Steel Forgings. A. Barker and E. H. Hardy. *Institution of Mechanical Engineers, Proceedings,* v. 171, 1957, p. 581-596.

Measurement by a trepanning method and by Sachs method. Possibility of plastic yielding during machining operations in the Sachs method and effect of this on the residual stress distribution in water quenched mild steel cylinders. Determination of residual stresses in an induction-hardened roll.
(Q25h, 1-54; AY, 4-51)

1142-Q. Creep Deflections and Stresses of Beam-Columns. T. H.

Lin. *Journal of Applied Mechanics,* v. 25, Mar. 1958, p. 75-78.

Calculation method for creep stresses and deflections, using integrating operators with Green's function to solve differential equation of equilibrium. Illustrative example is given for ideal H-section of 75S-T Al alloy, applying Shanley's creep hypothesis and his test data for 75S-T at 600° F. for constant stress within limited range (5000 ± 500 psi.) to varying stress over wider range (down to 750 psi.). Constant rate of deflection increase is shown for 1-10 hr. after loading.
(Q3, Q25; Al-b)

1143-Q. Stress-Raisers in Engineering Parts. (Digest of "Some Common Stress-Raisers in Engineering Parts".) G. A. Cottrell. Technical Report, British Engine, Boiler and Electrical Insurance Co., Ltd., New Series, v. 3, p. 91-112. *Metal Progress,* v. 74, Sept. 1958, p. 158, 160.

Stress-raisers of the same magnitude do not exert the same effect on different metals or even on different alloys of the same class. In general, most metals are notch sensitive, with the notable exception of cast iron and 18-8 stainless steel. Experiments have demonstrated that although the endurance limit of steel increases with tensile strength of unnotched specimens, it attains a maximum value of 160,000 psi. and then decreases with notched specimens.
(Q23s, Q25; ST, CI, SS)

1144-Q.* Cast Age-Hardenable Austentic Steels. E. A. Lange, N. C. Howells and A. Bukowski. *Modern Castings,* v. 34, Oct. 1958, p. 53-59.

Cr-Ni-P, Cr-Mn, and Cr-Ni-Mn-V steels for high-strength, nonmagnetic castings. Cr-Ni-P austenitic steel deyeloped 100,000-psi. yield strength. Cr-Mn austenitic steels were brittle when heat treated to high strength. Modifying the Cr-Ni-Mn-V composition resulted in an alloy with good ductility and 100,000-psi. yield strength. A fourth type of age-hardenable austenitic steel, Mn-V, containing a minimum of alloying elements was developed. 4 ref. (Q27, Q23, 2-60; SGB-a, SS, *Cr, Mn, Ni, V*)

1145-Q. Investigation of the Compressive Strength and Creep of 7075-T6 Aluminum-Alloy Plates at Elevated Temperatures. W. D. Deveikis. *National Advisory Committee for Aeronautics,* TN 4111, Nov. 1957, 28 p.

Elevated-temperature compressive strength from room temperature to 600° F. and creep test results from 350 to 500° F. for V-groove edge-supported plates of 7075-T6 Al alloy. Test results are analyzed to verify procedures for estimating maximum strength for material stress-strain curves and creep-failure stresses from isochronous stress-strain curves. Strength and creep results are also compared with similar results for 2024-T3 plates.
(Q28g, Q3m; Al-b, 4-53)

1146-Q.* Internal-Friction Study of Aluminum Alloy Containing 4 Weight Percent Copper. B. S. Berry and A. S. Nowick. *National Advisory Committee for Aeronautics,* TN 4225, Aug. 1958, 88 p.

Low-frequency internal friction measurements in both torsional and flexural vibration during aging. Both polycrystalline and single-crystal specimens exhibit an initial internal friction peak at 173° C. (for a frequency of 1 cps.) after solution treatment and quenching. This peak shows all the characteristics of a Zener relaxation, including strong anisotropy. It falls on aging in a manner simply related to the decrease in the Cu concentration of the matrix. This peak is also sensitive to the reversion of Guinier-Preston zones. (Q22; Al-b, *Cu*)

1147-Q.* Some Observations Relating to Recovery of Internal Friction During Fatigue of Aluminum. S. R. Valluri. *National Advisory Committee for Aeronautics,* TN 4371, Sept. 1958, 30 p.

Effective heat of activation for the process is approximately 10,000 cal. per g. mol. Variation of recovery with stress level and history indicates that recovery becomes independent of stressing history more quickly at higher stress levels. This recovery may be associated with the establishment of a subgrain structure and the basic process then happening may be one of indefinite to-and-fro motion of some free dislocations within the subgrains.
(Q22, Q7; Al)

1148-Q.* Creep of Nickel, Copper, and Nickel-Coppér Alloys. *National Bureau of Standards, Technical News Bulletin,* v. 42, Sept. 1958, p. 176, 177.

Tests were made at temperatures of 300°, 700° and 900° F. on initially annealed specimens of the two metals, and on a 70-30 Ni-Cu alloy, and

a 30-70 Ni-Cu alloy. Data derived from tests made at 700 and 900° F. indicate that the 30% Cu alloy was far more creep resistant than the 70% Cu alloy, regardless of the time under stress. The strengthening effects of alloying were more pronounced as the time of stress was increased and the temperature decreased. These observations were confirmed when the two alloys were tested at 1200° F. (Q3, 2-60; Ni, Cu)

1149-Q.* The Generation of Dislocations by Thermal Stresses. P. Penning. *Philips Technical Review,* v. 19, 1957-1958, p. 357-364.

During the pulling of Ge and Si crystals from the melt, a process widely employed in practice, a non-uniform temperature gradient arises. As a result, thermal stresses are formed in the material which may cause plastic flow or even fracture. Experiments on influence of rate of cooling a Ge rod on the state of internal perfection of the material. (Q25p, N3r; Ge, Si)

1150-Q.* High Silicon Additions Are Giving Aluminum Better Wear Properties. Richard M. Smith. *SAE Journal,* v. 66, Sept. 1958, p. 48-50.

Good wear properties and light weight of hypereutectic Al-Si alloys (greater than 11.6% Si) make it a likely candidate for pistons, cylinder liners, rocker arms, cylinder blocks and heads and brake drums. Effect and usefulness of phosphorus additions in controlling the size and dispersion of primary Si crystals. Q9n, T21b, T21c, 17-57; Al-b, *Si*)

1151-Q. Interim Report on Creep Behavior of Zircaloy-2 and Zircaloy-3. W. D. McMullen. Westinghouse Electric Corp., Bettis Plant, Pittsburgh. *U. S. Atomic Energy Commission WAPD-TM-132,* Apr. 1958, 20 p.

Zircaloy-2 was found to have much better creep properties than Zircaloy-3 even though their tensile properties are quite similar. The difference was magnified at lower second stage creep rates and/or higher temperatures. Creep of Zr and the Zircaloys tends to follow theoretical high-temperature creep behavior in agreement with the temperature dependence of other mechanical properties of Zr. 20 ref. (Q3; Zr-b)

1152-Q. Iron-Chromium-Aluminum Alloys. J. E. Srawley. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131676, Apr. 1958, 20 p. $.50.

Alloys containing up to 25% Cr and 11% Al produced by vacuum melting and hot worked by forging. Tensile properties at room and elevated temperatures were determined, and their resistance to oxidation in air and attack by the combustion products of residual fuel oils was studied.
(Q27a, 2-61, R1h, R7d; Fe, Cr, Al)

1153-Q. Static Strength of Cross-Grain 7075-T6 Aluminum Alloy Extruded Bar Containing Fatigue Cracks. Walter Illg and Arthur J. McEvily, Jr. *National Advisory Committee for Aeronautics,* TN 3994, Apr. 1957, 25 p.

Specimens were subjected to static tests to determine residual static strength. Small cracks resulted in disproportionately large reductions of static strength. Effects of biaxiality and ductility on notch sensitivity under static loading.
(Q27a, Q23s, 9-22; Al-b)

1154-Q. Effect of Cold Work on the Creep-Rupture Properties of a Series of Simple 18-8 Type Stainless Steels. Frank B. Cuff, Jr. and Nicholas J. Grant. Massachuetts Institute of Technology. *U. S. Office of Technical Services,* PB 127194, Feb. 1956, 37 p. (Available at Library of Congress, Washington, D. C. Microfilm $3, Photostats $6.30.)

Effect of cold work on the creep-rupture properties of a series of six simple 18-8 type stainless steels at 1100 and 1200° F. Compositional variation (15.7 to 21.8% Cr, 8.7 to 13.9% Ni and .042 to .075% C plus N) resulted in a M_s temperature variation from + 100° F. to absolute zero. A relationship was found among the compoistion, M_s temperature, recrystallization temperature and rupture-life. (Q3m, 3-68; SS)

1155-Q.* (German.) Investigation on the Grain Boundary Embrittlement of Complicated Die Forgings Made of AlZnCuMg.5. Wilhelm Rosenkranz. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 316-323.

On die forged pieces from this and other Al alloys intercrystalline fractures were observed along grain boundaries which resulted from varying deposits along these boundaries. These fractures were attributed to spontaneous recrystalli-

zation during deformation, which can be avoided through the addition of Fe, Mn and Cr. 8 ref.
(Q26s, N5, 2-60; Al-b, 4-51)

1156-Q.* Nuclear Radiation Effects on Materials. Gerald Reinsmith. *ASTM Bulletin,* no. 232, Sept. 1958, p. 37-47.

Effect on plain carbon steel, stainless steels, Ni, Zr, and Co alloys, as well as on several nonmetals. Sources of radiation, uses. 43 ref. (Q-general, 2-67; CN, SS, Ni, Zr, Co)

1157-Q.* A New Approach to the Problem of Creep. J. Glen. *Iron and Steel Institute, Journal,* v. 189, Aug. 1958, p. 333-343.

Creep data are plotted in the form of log strain, log creep rate curves (strain rate curves) to show transitions in creep rate in their true perspective. A family of such curves either at constant stress or at constant temperature form a regular pattern so that strain rate curves of tests at lower stress or temperature can be estimated. Ordinary strain-time-creep curves can be obtained by integration. This enabled accurate extrapolation of creep for rupture tests. Results of tests on several Mn steels used to illustrate creep transition phenomena and extrapolation of creep curves. 12 ref. (Q3, Q25n; ST)

1158-Q.* Vickers-Knoop Hardness Conversion. Lloyd Emond. *Metal Progress,* v. 74, Sept. 1958, p. 97.

Tests to determine relationships between Vickers diamond pyramid hardness (DPH) numbers and Knoop hardness at lighter loads than the standard 500 g. Three types of material were used—a low-carbon steel (A 212), a high-carbon steel drill rod and Monel metal. (Q29e; CN, Ni-b)

1159-Q.* Tap the Reserve Strength in Metal Parts. Dominic J. Graziano. *Product Engineering,* v. 40, Sept. 29, 1958, p. 44-47.

Equations and simplified design curves that will predict the maximum stress, moment and permanent deformation involved when pushing past the yield strength of a material under pure bending loads.
(Q25, Q5, T24, 17-51)

1160-Q. The Strengthening Effect of Beryllium on Zircaloy-3. R. E. Johnson and A. F. Steeves. Westinghouse Electric Corp., Bettis Plant, Pittsburgh. *U. S. Atomic Energy Commission, WAPD-TM-81,* Aug. 16, 1957, 25 p.

Ingots of Zircaloy-3 with 0.05, 0.15, 0.35 and 0.70% Be were melted by a double-consumable-electro-arc-melting process. Tensile strength increased with increasing Be content. After extruding and forging, the alloys showed considerably better properties than either Zircaloy-2 or 3. Hot tensile data indicated that the loss of strength with increasing temperature is not so great as that in the unmodified Zircaloys. 4 ref. (Q27a, 2-60; Zr-b, *Be*)

1161-Q. Phenomenological Relation Between Stress, Strain Rate and Temperature for Metals at Elevated Temperatures. Elbridge Z. Stowell. *U. S. National Advisory Committee for Aeronautics,* TN 4000, May 1957, 19 p. (Available at National Advisory Committee for Aeronautics, 1512 "H" St., N.W., Washington 25, D. C.)

Phenomenological relation suggested to account for the behavior of polycrystalline metals above the equicohesive temperature. The properties of the metal included in the relation are elasticity, linear thermal expansion and viscosity. The relation may be integrated under various conditions to provide information on creep rates, creep rupture, stress-strain curves, and rapid-heating curves.
(Q25n, Q21, P10f, P11g, 2-62)

1162-Q. Recovery of Embrittled Cadmium Plated Steel. H. H. Johnson, E. J. Schneider and A. R. Troiano. Case Institute of Technology. *U. S. Office of Technical Services,* PB 131654, Dec. 1957, 23 p. $.75.

Cadmium electroplate thickness influences the recovery rate of hydrogen-embrittled steel; the recovery rate decreases with increasing plate thickness. New and efficient technique for minimizing hydrogen embrittlement. (Q26s; ST, *Cd,* 8-12)

1163-Q. The Effect of Heat Treatment on the Stability and Creep Resistance of a Ti-Al-Mo Alloy. H. L. Gegel. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131673, Jan. 1958, 24 p. $.75.

Ti-Al-Mo alloys heat treated to high strength have good stability

and improved creep properties. Tests indicate that the stability of the alloy is inocuous and that transformation during testing helps to maintain the material strength. Mechanism of embrittlement by heat treatment.
(Q3, Q26s, 2-64; Ti-b, *Al, Mo*)

1164-Q. Theory of Creep of Dispersion-Hardened Alloys. J. Weertman. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131675, Apr. 1958, 11 p. $.50.

Creep equations derived for dispersion-hardened alloys. Following Schoeck, it is assumed that the rate-controlling process is the climb of dislocations over second-phase particles. At low stresses a first-power stress dependence is found; at intermediate stresses a fourth-power dependence; and at high stresses an exponential stress dependence. (Q3)

1165-Q. Tensile Properties of Inconel and RS-120 Titanium-Alloy Sheet Under Rapid-Heating and Constant-Temperature Conditions. George J. Heimerl, Ivo M. Kurg and John E. Inge. *National Advisory Committee for Aeronautics,* TN3731, July 1956, 29 p.

Rapid heating tests to determine the tensile strength of Inconel and RS-120 Ti alloy sheet heated to failure at uniform temperature rates from 0.2 to 100° F. per sec. under constant load conditions. Yield and rupture stresses obtained by rapid heating compared with yield and ultimate stresses from elevated-temperature tensile stress-strain tests for ½-hr. exposure. Applicability of master curves and temperature-rate parameters to the prediction of yield and rupture stresses and temperatures under rapid-heating conditions. (Q27a, 2-61; Ni-b, Ti-b, 4-53)

1166-Q. Effect of Atmosphere on Creep-Rupture Properties of a Nickel-Chromium-Aluminum Alloy. P. Shahinian and M. R. Achter. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131735, May 1958, 15 p. $.50.

Role of ductility in the effect of environment on creep and rupture properties was investigated employing a 76 Ni, 19 Cr, 4 Al alloy. Creep-rupture tests were conducted in air and in vacuum at 1300, 1500 and 1900° F. At low temperatures and high stresses, time-to-rupture was longer in vacuum than in air, but at high temperatures and low stresses the reverse was true.
(Q3m, 2-66; Ni-b, *Cr, Al*)

1167-Q. Metallurgical and Mechanical Characteristics of High-Purity Titanium Base Alloys. F. C. Holden, J. A. Houck, H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131817, Apr. 1958, 120 p. $2.75.

Relationships between thermal history, microstructure and mechanical properties for high-purity Ti-base alloys: Ti-Al-Mo, Ti-O-Mo, Ti-O-Al-Mo, Ti-C-Mo, Ti-O-Mn, Ti-O-Cu, Ti-C-Cu and Ti-Cu-Mn. Mechanical test data include tensile and flow properties, impact behavior over a range of temperatures, hardness, aging, and cooling-rate test data. Basic physical metallurgical principles involved.
(Q-general; Ti-b)

1168-Q. A Summary of Compressive-Creep Characteristics of Metal Columns at Elevated Temperatures. R. L. Carlson and G. K. Manning. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131825, Apr. 1958, 62 p. $1.75.

Study of the creep buckling of metal columns prior to collapse and at time of buckling. Solutions to creep buckling. Shanley's time-dependent tangent-modulus method has several practical advantages over other analytical solutions.
(Q3c, 2-62)

1169-Q. Effect of Prior Creep on Mechanical Properties of Aircraft Structural Metals. Pt. 2. 17-7PH Alloy (TH 1050 Condition). J. V. Gluck, H. R. Voorhees and J. W. Freeman. University of Michigan. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131826, Apr. 1958, 100 p. $2.50.

Little change in mechanical properties of 17-7PH (TH condition) stainless steel sheet results from exposure to creep at 600 to 900° F. Exposures were conducted for 10, 50 or 100 hr. either unstressed or at stresses giving up to 3% total deformation. Exposure at 800 and 900° F. had relatively little effect on mechanical properties. Changes that did occur were generally an increase in properties, and no loss was noted in any case.
(Q3, Q-general; SS)

1170-Q.* (English.) **Tests to Determine the Influence of Building up With Low-Hydrogen Electrodes on the Fatigue Strength of Medium-Carbon Steel Shafts.** *Lastechniek,* v. 24, July 1958, p. 158-159.

Results of rotating bend tests on medium-carbon steel shafts with one layer of weld deposit indicates that an endurance limit of about 70% of the limit of unwelded material can be reached. (Q7a, L24; CN-p)

1171-Q.* (English.) **On the Mechanism of Wear Between Metal Surfaces.** G. Yoshimoto and T. Tsukizoe. *Wear,* v. 1, June 1958, p. 472-490.

Analysis of the mechanism of wear between metal surfaces dependent on distribution of real area of contact. Assumption of a simple model which represents profile curves of a metal surface allows theoretical deduction of relationships between applied load in the number or size of the individual areas. Further assumptions as to the nature of the sliding process enable deduction of three types of wear for steel or cast iron: mechanical wear, Fe_2O_3 film wear and Fe_3O_4 film wear. These theoretical conclusions form basis for discussion of relationships of velocity and load to wear. 13 ref. (Q9)

1172-Q.* (English.) **A Simple Apparatus for Studying the Wear of Tungsten Carbide.** J. Golden and G. W. Rowe. *Wear,* v. 1, June 1958, p. 491-498.

Apparatus for testing transfer of radioactive tungsten carbide to steel or Cu during moderate speed sliding under various conditions. Wear track forms a close spiral about 20 ft. long. Zones of metal plate can be treated differently and effects on transfer of active slider can be studied in detail from autoradiographs. 5 ref. (Q9, 1-53; W, 6-69)

1173-Q.* (German.) **Hot Shortness and Grain Boundary Structure of Steel.** Friedrich Erdmann-Jesnitzer and W. Bernhardt. *Archiv für das Eisenhüttenwesen,* v. 29, June 1958, p. 353-357.

On sulphur-containing steel at temperatures around 1000° C., an increased susceptibility toward hot fracture along grain boundaries was observed. This is attributed to a eutectic of iron and iron sulphide. Armco iron was subjected to critical stretching after recrystallization, annealing and sulphurizing of surface, then the specimens were annealed at 659° C. for 8 to 48 hr. After etching the orientation angles between crystallites were determined. It was found that sulphur diffuses preferably into grain boundaries, where the angle of disorientation is about 18° C. 21 ref. (Q26, 2-62, M27c; ST)

1174-Q.* (German.) **Investigation on the Deformation Process of Iron-Silicon Alloys in Relation to Composition and Temperature.** Franz Lihl and Eduard Buhl. *Archiv für das Eisenhüttenwesen,* v. 29, June 1958, p. 365-375.

A number of Fe-Si alloys (1.0% to 6.1% Si) were subjected to extensive mechanical tests. Influence of pre-annealing upon the curve in the notched bar impact strength temperature diagram between −100 up to 1000° C. was determined. Also the curve for tensile strength, fracture elongation and notched bar impact strength in relation to temperature was investigated for alloys between 4.5 and 5% Si. 12 ref. (Q-general, 2-60, 2-61; Fe, *Si*)

1175-Q.* (German.) **Applicability of the Fatigue Strength Theory of F. Stuessi Upon the Results Obtained From Long-Time Fatigue Tests.** Werner Stauffer and Alfred Keller. *Archiv für das Eisenhüttenwesen,* v. 29, July 1958, p. 411-414.

A three-dimensional diagram for the endurance limits is established from mean stress, stress amplitudes and the logarithm of the number of cycles. Also the equation for the Wochler diagram is developed. These theories then are applied to endurance test results on a carbon steel and eight alloyed high-temperature steels. 7 ref. (Q7; CN, SS, SGA-h)

1176-Q.* (German.) **Heat Treatable Hot Working Steels: Mechanical Properties at Elevated Temperatures.** Karl Bungardt and Otto Mulders. *Stahl und Eisen,* v. 78, Aug. 7, 1958, p. 1119-1126.

Influence of different tempering and testing temperatures on mechanical properties (P) of steels. Behavior varies according to formula $P = T o_k(19 + \log t)$ where T = annealing temperature in °K, t = annealing time in hours. Tensile strength and 0.2% elongation limit decrease with tempering. Elongation and reduction of area are more irregular depending on steel composition. Materials with high retention of hardness and high resistance to

heat show range of brittleness; with lower heat resistance and hardness retension plasticity increases steadily with testing temperature.
(Q-general, 2-62; ST)

1177-Q.* (German.) **Influence of Hydrostatic Pressure Upon Stress Deformation of Single Crystals.** Peter Haasen and Andrew W. Lawson, Jr. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 280-291.

Influence of 5000 atm. hydrostatic pressure on stress-strain diagram of single crystals of Al, Cu, Ni, alpha-brass and polycrystalline Ni. The yield point was elevated in all cases, except on Ni single crystals, beyond the pressure coefficient of the modulus of elasticity. The crystal is work-hardened under pressure of 1 atm., which is indicated through an increase of yield stresses. 33 ref.
(Q27, 3-74; Al, Cu, Ni, 14-61)

1178-Q.* (German.) **Lattice Deformation and Residual Strains in Pure and Alloyed Aluminum Specimens After Stress Deformation.** Eckard Macherauch and Paul Müller. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 324-331.

X-ray investigations were made on polycrystals of pure and alloyed Al (duralumin) after plastic deformation and measurements of residual strains were compared to theoretical residual lattice strains. The theory of G. B. Greenough was not verified. Rather a characteristic compression state of the first degree was found. The diagram of residual stresses in relation to plastic deformation had the same shape as the stress-strain diagram reduced by the factor 0.4. 26 ref.
(Q25h, Q24, M26; Al)

1179-Q.* (Russian.) **Embrittlement of 20KhN14S2 Steel During Aging at 500-650°.** A. V. Tikhomirov, N. V. Sukhobokova and N. A. Tikhomirova. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 22-25. (Henry Brutcher, Altadena, Calif., Translation no. 4316.)

Investigation of austenitic stainless steel used in electric power construction which shows tendency toward intercrystalline corrosion and brittleness. Aging of steel at intervals of 500-650° C. shows tendency to brittleness with a lowering of plasticity and impact strength. The sharpest drop in impact strength takes place during first period of aging (i.e., the first 200-300 hr.). On further exposure impact strength decreases more slowly. Stabilization after tempering has no effect on aging process.
(Q26s, Q6n, R2h; SS-e)

1180-Q.* (Russian.) **Study of Action of Superheated Steam on the Rupture Strength of Austenitic Steel.** E. A. Davidovskaya and L. P. Kestel'. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 29-33. (Henry Brutcher, Altadena, Calif., Translation no. 4318.)

Steel tube 102 to 68 mm. diameter tested at 600°. Superheated clean steam without salt admixture does not lower strength of steel at high temperatures. However, presence of different types of salt has effect on walls of steampipes and lowers their strength when subject to great stress. It is therefore important to guard against any salt admixtures in steam used in boilers.
(Q27a, 1-66; SS-e)

1181-Q. Effect of Tool Design and Degree of Deformation on Distribution of Deformation in Pressed Steel Blanks. Yu. F. Chernyi. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 51-56. (Henry Brutcher, Altadena, Calif., Translation no. 4323.)

Tests made on heat resistant EI481 steel. Metallographic study of deformation on basis of reduction in size of original grains. The greatest nonuniformity in grain deformation was noted in peripheral zone of blanks. Least grain deformation was found in surface layers. As a result. metal in peripheral zone had a lowered plasticity. The identical size of grains in the cross-sectional area of pressed billets and blanks points to possibility of modulation of deformation process of grains of large ingots.
(Q24, G1; AY, SGA-h)

1182-Q.* (Russian.) **Influence of Increased Arsenic Content on Ductility of Rail Steel.** F. F. Sviridenko. A. N. Popova and M. G. Fradina. *Stal',* v. 18, Aug. 1958, p. 739-741.

Increasing As content from 0.13 to 0.25% has little effect on rail strength and does not alter its stability when tested on a ram impact machine. Tests were conducted after nine months aging. (Q23p, 2-60; ST)

1183-Q.* The Mechanical Properties and Heat Treatment Response of Zirconium-Uranium Alloys. W. Chubb and F. A. Rough. *American Society for Metals, Transactions,* v. 51, Preprint no. 84, 1958, 20 p.

Mechanical properties and heat treatment response of Zr alloys containing 0 to 100% U. Effect of typical heat treatments upon mechanical properties. Tensile properties, hardness and dynamic modulus data at various temperatures. Heat treatment response was determined primarily in terms of end-quench tests from 900° C. Results show a consistent pattern of behavior and permit practical heat treatment schedules to be devised. 6 ref.
(Q-general, 2-64, Zr, U)

1184-Q.* Hydrogen Embrittlement and Delayed Failure in Titanium Alloys. R. D. Daniels, R. J. Quigg and A. R. Troiano. *American Society for Metals, Transactions,* v. 51, Preprint no. 86, 1958, 17 p.

Hydrogen-induced delayed failure in an alpha-beta Ti alloy was sensitive to microstructure. A quenched structure was less susceptible to delayed failure than aged or annealed structures. The tendency for delayed failure was magnified in all structures by an increase in hydrogen content or an increase in strength level. Hydrogen-induced delayed failure occurred by a process of crack initiation and controlled crack growth. Plastic strain resulting from creep tended to retard crack initiation. 12 ref.
(Q26s, 3-71; Ti-b, *H*)

1185-Q.* Some Low-Temperature Observations of 1020 Steel. F. S. Deronja and M. Gensamer. *American Society for Metals, Transactions,* v. 51, Preprint no. 87, 1958, 11 p.

At grain size ASTM 4, 1020 steel has a 68° F. higher ductile-to-brittle transition temperature than at grain size ASTM 6, in simple tension. A 100-fold increase in testing speed has the effect of narrowing the transition range. The temperature at which there is a decrease in fracture stress was found to coincide with the approximate temperature at which twins first appear. Small jogs were observed in the load-extension curves and were found to be essentially due to twinning. Twinning precedes crack nucleation and propagation in the brittle range, and above the transition temperature can occur before the yield point phenomenon. 8 ref.
(Q23, Q24, 2-63; CN)

1186-Q.* The Phenomenon of "Negative Creep" in Alloys. R. W. Fountain and M. Korchynsky. *American Society for Metals, Transactions,* v. 51, Preprint no. 91, 1958, 13 p.

Measured creep elongation is a sum of true plastic deformation and length changes, resulting from the structural instability of alloys. As a special case, the contraction caused by a metallurgical solid-state reaction during creep testing may outweigh the elongation due to the applied stress and result in a phenomenon termed "negative creep". From the examples of some Fe-W and Ni-Mo alloys, it is shown that the amount of contraction can be calculated from the known phase relationships and crystallographic data. Experimental results illustrating "negative creep" in these alloys. 15 ref. (Q3, P10d)

1187-Q.* The Effect of Heat Treatment on the Elevated Temperature Stress Stability of Titanium Alloys. M. L. Greenlee, G. A. Lenning, W. M. Parris and H. D. Kessler. *American Society for Metals, Transactions,* v. 51, Preprint no. 94, 1958, 18 p.

Effect of heat treatment on unnotched and notched tensile properties, notch-bend impact strength, and elevated-temperature stress stability were investigated for three commercial Ti alloys. Strength increases obtained by heat treatment were of the order of 65,000 psi. for the Ti-140A alloy, 75,000 psi. for the Ti-155A alloy and 25,000 psi. for the Ti-6Al-4V alloy. No decrease in notch ductility or indication of instability was observed at the maximum strength level obtained for the Ti-6Al-4V alloy. 3 ref.
(Q27a, 2-62, 2-64; Ti-b)

1188-Q.* Effect of Strain Rate and Temperature on the Compressive Flow Stresses of Three Titanium Alloys. A. J. Griest, A. M. Sabroff and P. D. Frost. *American Society for Metals, Transactions,* v. 51, Preprint no. 95, 1958, 10 p.

Compression studies on unalloyed Ti, Ti-6Al-4V, and Ti-4Al-4Mn alloys in the range 1450 to 1725° F., and at strain rates in the range 0.0002 to 0.01 in. per in. per sec. At hot working temperatures the flow stresses of Ti alloys were markedly sensitive to strain rate. Increase of flow stress with increasing strain rate was greater for the Ti-6Al-4V and Ti-4Al-4Mn alloys than for unalloyed Ti. 16 ref.
(Q28, 2-61, 3-68; Ti-b)

1189-Q.* A Simplified Procedure for Calculating Peak Position in X-Ray

Residual Stress Measurements on Hardened Steel. D. P. Koistinen and R. E. Marburger. *American Society for Metals, Transactions,* v. 51, Preprint no. 102, 1958, 14 p.

New correction and calculation procedures for X-ray diffraction measurement of residual stresses in hardened high-carbon steels. Corrections for X-ray diffraction peak symmetry achieved by using standardized table of theta dependent, multiplicative factors based upon theoretical factors influencing diffractive intensity. Simplified parabola-fitting technique for establishing position of peak. Correlation of stresses measured by this technique with stresses measured by Christenson-Rowland technique and by a mechanical dissection technique. 7 ref. (Q25h, M22g, 1-54; ST)

1190-Q.* Stress Effects of Abrasive Tumbling. H. R. Letner. *American Society for Metals, Transactions,* v. 51, Preprint no. 104, 1958, 17 p.

Toolsteel specimens at four hardness levels were tumbled with aluminous abrasives under a variety of conditions and resulting surface stresses were measured. Behavior was observed for three initial stress conditions: stress-free surfaces, ground surfaces and heat treated surfaces. Residual stresses induced in initially stress-free steels by tumbling were compressive at the surface and decreased uniformly to zero at a depth of a few thousandths of an inch. The magnitude and depth of penetration of the stress increased with abrasive particle size. Maximum compressive stress at the surface increased and thickness of stress layer decreased with increasing steel hardness. Tumbling modified initial surface stresses and replaced them with its own characteristic compressive stress. 9 ref. (Q25h, L10d; TS)

1191-Q.* Thermal and Mechanical Fatigue of Nickel and Titanium. Harry Majors, Jr. *American Society for Metals, Transactions,* v. 51, Preprint no. 105, 1958, 12 p.

Thermal and load cycling tests were conducted on 0.500-in. diameter (I.D.) thin-walled tubes of Ti and Ni in direct loading under a constant mean temperature. Stresses and plastic strains were obtained. Controlled loading conditions were maintained by automatic electric timing circuits and resistance heating of the specimens. Analysis of the microstructure shows the influence of thermal cycles. 11 ref. (Q7j; Ni, Ti)

1192-Q.* The Application of Time-Temperature Parameters to Accelerated Creep-Rupture Testing. S. S. Manson, G. Succop and W. F. Brown, Jr. *American Society for Metals, Transactions,* v. 51, Preprint no. 106, 1958, 15 p.

Procedure for application of time-temperature parameters in determining isothermal creep-rupture curves when no previous data exist. Parameter constants and master curves determined over a wide stress range with a minimum expenditure of testing time. Isothermals are calculated for "17-22-A" steel and austenitic 16-15-6 alloy and the values are extended approximately two time cycles beyond the longest test necessary to develop master curves. Results of calculations are compared with isothermal data established by conventional test procedures. Concluded that the use of correct time-temperature parameters can greatly reduce required testing time. 15 ref. (Q3, 1-54; SS)

1193-Q.* High-Temperature Properties of Vacuum-Melted Superalloys. F. M. Richmond. *SAE Transactions,* v. 66, 1958, p. 193-199.

Improved high-temperature rupture strength and ductility of Ni-base superalloys has been obtained by vacuum melting and by certain modifications in the nominal chemistry. Melting technique. Tensile and rupture properties of five Ni-base vacuum-melted alloys for the temperature range 1000-1600° F. 10 ref.
(Q27a, 2-62, Q3, C25; Ni-b, SGA-h)

1194-Q.* Correlations of Brittle-Fracture Service Failures With Laboratory Notch-Ductility Tests. P. P. Puzak, A. J. Babecki and W. S. Pellini. *Welding Journal,* v. 37, Sept. 1958, p. 391s-407s.

Materials involved in the fractures included plain carbon steels from ships; A285 plain carbon and A212 C-Si steels from pressure vessels; A204 and A302 Mn-Mo steels from pressure vessels; A293 Ni-Mo-V steels from a pressure vessel and a turbine spindle; A293 Cr-Mo-V steel from retaining rings; 12% Cr cast martensitic stainless steels from ship propellers; and quenched and

tempered 3½ Ni, 1% Cr steel from forged machinery components. 13 ref. (Q26s, Q23p; CN, AY)

1195-Q.* Design Values for Thermal Stress in Ductile Materials. B. F. Langer. *Welding Journal,* v. 37, Sept. 1958, 411s-417s.

Methods for application of strain-cycling data to practical design problems involving thermal stress. Multi-axial stress conditions, combined steady and alternating stress and cumulative damage. When the calculated thermal stress exceeds the yield stress of a ductile material, some of the commonly used concepts, such as the Soderberg diagram, must be modified. 18 ref. (Q25p, 17-51)

1196-Q.* Thorium in Magnesium Technology. T. E. Leontis. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 29-53.

Physical and mechanical properties of Mg-Th and Mg-Th-Zr alloys; effect of Zr, Mg, Zn and rare earth additions on mechanical properties; commercial cast Mg alloys containing Th; commercial wrought Mg-Th alloys. 12 ref.
(Q-general, P-general, 2-60; Mg, *Th*)

1197-Q.* Mechanical Properties of Thorium and High-Thorium Alloys. J. A. Milko, R. E. Adams and W. O. Harms. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 186-216.

Properties of bomb-reduced and iodide Th and of high-Th alloys. Results of tensile, compression, torsion, fatigue, impact and hardness tests, and effects of testing temperature and alloying additions. 15 ref.
(Q-general, 2-61, 2-60; Th)

1198-Q. Another Turbogenerator Failure. R. James Landrun. *Metal Progress,* v. 74, Sept. 1958, p. 91-94.

Another failure in a turbogenerator similar to the accident in Toronto was due to the presence of fatigue cracks at ventilating holes. These acted as stress-raisers during temporary and minor overspeeding, inducing an almost instantaneous brittle failure which wrecked the machine, fortunately without human casualty.
(Q26s, Q7, W11q, 17-51; AY)

1199-Q. Material-Property-Design Criteria for Metals. Pt. 4. Conventional Short-Time Elevated-Temperature Properties of Selected Alloys. W. P. Achback, R. J. Favor and W. S. Hyler. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 131515, Oct. 1957, 258 p. $6.

Data on conventional short-time elevated-temperature properties of selected light alloys applicable to airframe and missile fabrication.
(Q-general, 2-62; T24)

1200-Q. (Book.) **Calculations of Deformations of Welded Metal Structures.** N .O. Okerblom. 234 p. 1958. H. M. Stationery Office, Atlantic House, Holborn Viaduct, London, England E.C.1. 15sh.

Translation of Russian text, issued in 1955, for calculating deformation arising during fabrication of welded structures. (Q24, 7-51)

1201-Q. (Book.) **Sheet Materials for High Temperature Service.** 74 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $2.95.

Papers presented at the first Southwestern Metal Congress, Dallas, Tex., May 12-16, 1958. Papers abstracted separately.
(Q-general, 2-63, T24, 17-57; SGA-h, 4-53)

1202-Q. (Book—German.) **Handbook of Materials Testing. V. 1. Testing. Measuring Instruments.** Erich Siebel and N. Ludwig. 890 p. 1958. Lange & Springer. Reichpietschufer 20, Berlin 35, West Germany. DM 148.50.

Pressure, bending, tension and torsion, impact and hardness testing; nondestructive testing, metallography, composition analysis.
(Q-general, S-general, M-general, 1-53)

1203-Q. (Book—German.) **Handbook of Materials Testing. V. 2. Metals.** Erich Siebel. 754 p. 1958. Lange & Springer. Reichpietschufer Berlin 35, West Germany. DM 118.50.

Mechanical property tests at high and low temperatures, weld and wire testing, corrosion testing.
(Q-general, R11, 2-62, 2-63)

1204-Q.* The Change of Fatigue Limit on Chromium or Nickel Plating With Particular Reference to the Strength of the Steel Base. C. Williams and R. A. F. Hammond. *Institute of Metal Finishing, Transactions,* v. 34, 1956-1957, p. 317-353.

A variety of steels of different compositions and ultimate tensile

strengths were plated and, for unbaked deposits, a linear relationship between the percentage change in fatigue strength on Cr plating and the fatigue limit of the steel substrate was established. It is thus possible to predict the percentage change in fatigue strength for deposits of known internal stress from the fatigue limit, the ultimate tensile strength, or hardness of the steel, irrespective of its composition; a simple formula is derived. 26 ref. (Q7a; ST, *Cr*, *Ni*, 8-12)

1205-Q.* Self-Restraint in Steel in Relation to Brittle Fracture. S. A. Main. *Iron and Steel*, v. 31, Oct. 1958, p. 479-484, 498.

Self restraint is effected in two, or possibly three, different ways. It can act in a purely static manner. Under dynamic conditions it is exerted additionally by the inertia of the metal and possibly to some extent through viscosity. The reactionary effects of self-restraint are illustrated by reference to the more ordinary forms of mechanical test. 15 ref. (Q26; ST)

1206-Q.* Elastic Constants of Silver and Gold. J. R. Neighbours and G. A. Alers. *Physical Review*, v. 111, Aug. 1, 1958, p. 707-712.

The three elastic constants C_{44}, $\frac{1}{2}(C_{11} - C_{12})$, and $\frac{1}{2}(C_{11} + C_{12} + 2C_{44})$ have been directly measured in the temperature range between 4.2 and 300° K. The various contributions to the values of the 0° K. constants are analyzed in terms of a simple model which quite successfully describes Cu. It is concluded that such a model is unsatisfactory when applied to the heavier noble metals because these appear to have large noncentral forces contributing to their constants. Combined with pressure data, the present results show the elastic constants to be explicit functions of temperature. The Debye characteristic temperatures calculated from the 0° K. elastic constants are shown to be in substantial agreement with the results from calorimetry. 19 ref. (Q21e; Ag, Au)

1207-Q.* Pressure Derivatives of the Elastic Constants of Copper, Silver and Gold to 10,000 Bars. W. B. Daniels and Charles S. Smith. *Physical Review*, v. 111, Aug. 1, 1958, p. 713-721.

Measured over the pressure range from 0 to 10,000 bars, using a modified ultrasonic pulse-echo method. Means are devised to measure the change of elastic constant with pressure as directly as possible. The data for each metal, of the three elastic constants and their pressure derivatives, are interpreted in terms of conventional theory. The analysis indicates that these must be noncentral, many-body interactions to account for the shear constants and especially their pressure derivatives. The many-body character of the interactions is of rapidly increasing importance in the sequence Cu, Ag and Au. 31 ref. (Q21, 3-74; Cu, Ag, Au)

1208-Q. Mechanical Properties of Uranium-Molybdenum Alloys. M. B. Waldron, R. C. Burnett and S. F. Pugh. *United Kingdom Atomic Energy Authority*, AERE M/R 2554, 1958, 33 p.

Tensile properties and hardness of U-Mo alloys in the composition range 0-14% Mo studied at room and elevated temperatures. At lower concentrations, the breakdown of the gamma solid solution to unstable microstructures leads to pronounced aging effects. Above 5.5% Mo the gamma solid solution is retained to room temperature and shows enhanced properties up to 800° C. 11 ref. (Q27a, Q29n; U, *Mo*)

1209-Q. Some Effects of Cold Rolling, Annealing and Aging on the Mechanical Properties of Zircaloy-3B. D. E. Johnson. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission, HW-53621*, Nov. 15, 1958, 58 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.25.

Tensile properties of Zircaloy-3B as a function of the cold worked condition of the material between the limits of 0 and 80% cold work. Tensile properties were also determined for test temperatures of −50, 22, 100, 200 and 300° C. Effect of short-time and long-time annealing on the tensile properties and of alpha-phase annealing treatments on microstructure and mechanical properties of a simulated Zircaloy-3B weld structure. (Q27a, 2-64, 2-65, 3-68; Zr-b)

1210-Q. The Influence of Composition Upon the 1500° F. Creep-Rupture Strength and Microstructure of Molybdenum-Chromium-Iron-Nickel Base Alloys. T. K. Roche. Oak Ridge National Laboratory. *U. S. Atomic Energy Commission, ORNL-2524*, July 9, 1958, 110 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $2.75.

Influence of composition variation upon the 1500° F. creep-rupture strength and microstructure. Alloys contained 10 to 20 Mo, 5 to 10 Cr, 4 to 10 Fe, 0.5 Al, 0.5 Mn, 0.6 C, balance Ni. Composition of the individual alloys was varied systematically with the intent that, by direct comparison, the effect of an element upon strength could be determined. 7 ref.
(Q3m, M27, 2-60; AY)

1211-Q.* **The Effect of Size on the Looseness of Wear Fragments.** Ernest Rabinowicz. *Wear,* v. 2, Aug. 1958, p. 4-8.

Whether a fragment transferred during sliding comes off as a loose wear particle depends on whether its elastic energy exceeds the surface energy at its point of attachment. Calculations show that, for an equiaxed fragment, there is a critical size such that smaller fragments remain adherent while larger fragments come off in loose form. Experimental support for this critical size concept is cited. 8 ref. (Q9)

1212-Q.* **Wear of Carbide Tools and Surface Finish Generated in Finish Turning of Steel.** Vladimir Solaja. *Wear,* v. 2, Aug. 1958, p. 40-58.

Concentrated tool wear, localized upon the boundaries of the areas of contact between rake face and chip and between the clearance face and workpiece, is a specific phenomenon encountered in turning of steel. It causes the surface finish to deteriorate rapidly, and in addition it can be supposed to be associated with the dimensional accuracy and the condition of surface layer of the workpiece. A number of variables including the grade of carbide tips used, workpiece material, rake and clearance angle of tools, feeds and speeds, were studied. 11 ref.
(Q9, G17; ST, 6-69)

1213-Q. (Czech.) **Plastic Stresses in Steels.** J. Nemec. *Hutnické Listy,* v. 12, no. 4, 1957, p. 315-324.

A solution is obtained to the problem of calculating the stress condition of nonhomogeneous material in the plastic range. Relationships between statistical strength of ductile steels and the fundamental physical parameters of the deformation of ferrite. Comparison of mathematical principles of the plastic state according to the theory of instantaneous stress condition and the theory of propagation of plastic deformation. Both theories are compared with experimental findings.
(Q24; ST)

1214-Q. (Chinese.) **Nature of Internal Friction Peaks Due to Stress-Induced Diffusion of Carbon in Alloy Steels With a Face-Centered Cubic Lattice.** Ke Tin-Sui, Tsian' Chzhi-Tsian and Uli Siuebao. *Acta Physica Sinica,* v. 12, no. 6, 1956, p. 607-621.

Internal friction peaks due to diffusion through an applied stress were observed in four types of Mn steel with a face-centered cubic lattice, containing 18.5, 25.4, 36% Mn and 9.5% Mn, 8% Ni and 3% Cr respectively. The optimum internal friction was observed at about 250° C. and an oscillation frequency of about 2 cycles per sec. The height of the internal friction peak varies in direct proportion to the C content in solid solution.
(Q22, N1; AY, *Mn*)

1215-Q. (Chinese.) **Internal Friction Peak Due to Stress-Induced Diffusion of Carbon in Martensite of Low-Carbon Steel.** Ke Tin-Sui, Ma In-Lian, Uli Siuebao. *Acta Physica Sinica,* v. 13, no. 1, 1957, p. 69-77.

Using torsional pendulum methods, at a temperature of 155° C. and an oscillation frequency of 2 cycles per sec., a maximum of internal friction was observed; conditions of occurrence were martensitic structure of the specimen and C and Ni impurities. An analogous peak was observed in Cr and Cr-Ni steels. In steel containing 29.7% Ni, the size of the internal friction maximum is directly proportional to carbon content.
(Q22, N1; CN-g, AY)

1216-Q.* (French.) **Influence of Duration of Charging and of Exposure to Ordinary Atmosphere on Hydrogen Brittleness in Steels.** J. Plusquellec, P. Azou and P. Bastien. *Comptes Rendus,* v. 246, June 23, 1958, p. 3454-3457.

Specimens of extra mild steel (0.08% carbon) from which all residual H had been removed were subjected to H charging for periods up to 100 hr. and exposed to ordinary air for different times before tensile testing. General capacity for deformation was lowered by presence of H, with reduction of area decreasing when duration of charging was increased. Fragility decreased in proportion to increased duration of exposure to air before testing. 4 ref. (Q26s; CN)

1217-Q. (Russian.) **Study of the Internal Friction in Gamma and Alpha-Phases of High-Chromium Steels.** Yu. V. Pigusov. *Doklady Akademii Nauk SSSR*, v. 112, no. 4, 1957, p. 636-639.

Specially melted steel 105 Kh 12 containing 1.05% C, 11.9% Cr, 0.012% N investigated. On curves correlating temperature and internal friction of specimens quenched from 800-1020° C. into water, a maximum value of internal friction appears about 210° C. at a frequency of 1.4 cycles per sec. Maximum value of internal friction about 210° C. is caused by interatomic reactions of the carbon with lattice defects, the latter being initiated by elastic stresses in the martensite lattice. (Q22; AY, *Cr*)

1218-Q.* (Russian.) **Effect of Forced Slipping at the End of Plastic Compression of Metals.** K. V. Savitskii and M. P. Zagrebennikova. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 113-119.

The effect of forced rotation of one of the supporting plates of a press investigated while the metal sample was being compressed. Results were plotted to compare with those obtained by compressing metal in the usual manner. The effect of speed of slipping on one side and alternate rotation of plates were examined. 5 ref. (Q28, Q1)

1219-Q. (Russian.) **Microstresses in Hardened Steel on Friction.** F. Ya. Iokheles and V. I. Startsev. *Metallovedenie i Obrabotka Metallov*, no. 3, 1957, p. 15-22.

Changes of microstresses in the crystal lattice, the dimensions of zones of coherent diffraction, as well as variation in microhardness and phase composition in thin surface layers in carburized, quenched and tempered steel 18 KhNWA investigated by X-ray in the processes of friction and wear. A series of tests consisted of several loading periods of 0.5×10^6 cycles each. X-ray diagrams were taken from six positions of the profile of the disk corresponding to different slip rates. The value of residual stresses and grain size determined from the form of the diffraction lines by means of harmonic analyses. (Q9, 3-66; ST)

1220-Q. (Russian.) **Temper Brittleness of the Second Type-Thermal Aging of Steel.** K. M. Pogodina-Alekseeva. *Metallovedenie i Obrabotka Metallov*, no. 3, 1957, p. 36-40.

Investigation of 45 G2, 30 KhGSA, 15 GS, and 12 KhNZA steels after conventional heat treatment. Embrittlement was accomplished by an anneal at 600-660° C. followed by slow furnace cool, or by repeatedly annealing soft tempered nonbrittle specimens to 550° C. with subsequent water cool. Temper brittleness of the second type is caused by the processes of dissolution of excess phases in ferrite, of concentration of the constituents in the grain boundary layers, and of their subsequent precipitation in form of individual phases with different degrees of dispersion. Analogous processes occur on thermal (precipitation) hardening of steel. (Q26s, N7; AY)

1221-Q. (Russian.) **Correlation Between Temperature and Internal Friction of Some Pure Metals.** V. S. Postnikov. *Uchenye Zapiski (Kemerovskii Gossudarstvenny Pedagogicheskii Institut)*, Series 1, 1956, p. 191-204.

Changes of internal friction as related to temperature investigated on Al, Ti, Co, Ni, Cu, Mo and W after annealing at 800° C. The ratio of the logarithmic damping decrement of free torsional oscillations to the number 11 was adopted as a measure of internal friction. It is experimentally demonstrated that the maximum of the internal friction (or the change of slope) is located in the range of recrystallization of a metal. Location depends on the height of the prior plastic deformation. Increase in plastic deformation leads to a displacement of the maximum to lower temperatures. (Q22, 2-61; Al-a, Ti-a, Co-a, Ni-a, Cu-a, Mo-a, W-a)

1222-Q.* (Spanish.) **Silicon-Bearing Cast Irons.** Mario Pujol. *Instituto del Hierro y del Acero*, v. 11, Apr-June 1958, p. 104-117.

Corrosion resistance and mechanical properties of spheroidal graphite iron containing 5.5% Si were good at temperatures up to 850° C. For higher temperatures, Si content of 6.5% gave satisfactory results. In lamellar iron with equivalent Si contents corrosion resistance was approximately the same, but mechanical properties were considerably inferior. 4 ref. (Q-general, R-general, 2-60, 2-61; CI-q, *Si*)

1223-Q.* (Spanish.) **Contribution to the Study of the Pearlitic Matrix of Gray Cast Iron.** Jose Navarro and

Luis Froufe. *Instituto del Hierro y del Acero*, v. 11, Apr-June 1958, p. 118-127.

An equation is deduced in which Brinell hardness of iron appears as function of hardness of matrix and notch factor of contained graphite. Statistical measurements of microhardness of pearlite grains of test bars gave virtually constant values. However, hardness of iron itself varied greatly. Calculation of tensile strength of pearlitic matrices, based on previous hardness measurements and on study of appropriate parameters, revealed no appreciable variation except for low coefficients of saturation. From comparison of hardness values and tensile strength of iron and its respective matrices, over-riding importance of effect of graphite in decreasing strength and hardness of unalloyed cast irons is deduced. 11 ref. (Q29n, Q27a; CI-n)

1224-Q.* (Spanish.) Microhardness. Francisco Munoz del Corral and Luis Alonso. *Instituto del Hierro y del Acero*, v. 11, Apr-June 1958, p. 128-137.

Specimens of 99.9% Cu and hardened steel were prepared for hardness testing by various combinations of machining and metallographic techniques. General conclusions were drawn as follows: A soft metal becomes brittle and exhibits high microhardness values under low loads as a result of alterations to surface layer. (However, annealed Cu specimens reduced 40 to 60% by cold rolling gave lower hardness values under low loads.) High hardness values can be corrected to correspond largely to hardness of nucleus by annealing in argon atmosphere and extended electrolytic polishing. A hard metal undergoes frictional heating and softening during machining and mechanical polishing, and gives lower hardness readings under small loads than under heavy loads. In this case, removal of softened surface layer by careful grinding and elimination of tendency to soften by tempering make it possible to obtain reasonably constant hardness values regardless of load. 7 ref.
(Q29q, Cu, ST)

1225-Q.* Cast Alloy Resist Heat. *Iron Age*, v. 182, Oct. 16, 1958, p. 192-194.

Some cast alloys will stand up well at 1500° F., others will operate satisfactorily up to 2000° F. Choose the alloy in terms of both temperature and operating conditions. Table of the chemistry of cast heat resistant alloys; charts showing how elevated temperatures affect heat resistant casting properties.
(Q-general, 2-62; 17-57; SGA-h, 5-60)

1226-Q.* Austenitic Manganese Steels for Abrasive Wear. *Iron Age*, v. 182, Oct. 16, 1958, p. 196-197.

Tough, ductile and nonmagnetic austenitic Mn steels can withstand both severe wear and heavy impact. Tables show mechanical, fatigue and physical properties.
(Q9, Q general; AY, *Mn*)

1227-Q.* Mechanism of Beneficial Effects of Boron and Zirconium on Creep-Rupture Properties of a Complex Heat-Resistant Alloy. R. F. Decker and J. W. Freeman. *National Advisory Committee for Aeronautics*, TN 4286, Aug. 1958, 54 p.

Mechanism by which the addition of B and Zr improves the creep-rupture properties of an alloy of 55% Ni, 20% Cr, 15% Co, 4% Mo, 3% Ti and 3% Al was investigated at 1600° F. Materials with varying B and Zr content were exposed to creep conditions, then the microstructures were analyzed by optical and electron microscopy, electron diffraction, microfractography and hardness measurements. Interrupted creep tests that allowed comparisons of materials after equivalent creep exposures were particularly useful. Creep-rupture properties were improved because B and Zr have a pronounced stabilizing effect on the grain boundaries of the alloy. 44 ref.
(Q3m, 2-60; Ni-b, SGA-h)

1228-Q. Effects of Irradiation on Some Uranium-Plutonium Alloys. J. H. Kittel and L. R. Kelman. Argonne National Laboratory. *U. S. Atomic Energy Commission ANL-5706*, 23 p. June 1958. (Available from U. S. Office of Technical Services, Washington 25, D. C.) 75c.

Cast alloys of uranium with 3.7, 6.6 and 13.0% Pu, and extruded alloys with 9.5, 14.1 and 18.7% Pu were investigated. Cast specimens developed severe surface roughening as a result of the irradiation they received, presumably because of excessively large grain sizes present before irradiation. As-extruded alloy specimens maintained good surface smoothness under irradiation but showed elongations which were dependent on Pu content. 11 ref.
(Q9, Q27, S15, 2-67; U, Pu)

1229-Q.* **Dependence of the Relative Heat Resistance on Composition in the System Cu-Ni-Si.** I. I. Novikov and L. I. Dautova. *Academy of Sciences of the USSR, Proceedings,* v. 115, (1957), p. 689-693. (Translation by Consultants Bureau Inc.)

Effect of various compositions on heat resistance (based on hardness of alloy at 700° C.), which rises to a maximum in heterogeneous regions of the phase diagrams. 13 ref. (Q-general, 2-52; Cu, Ni, Si)

1230-Q.* (Czech.) **Stresses in the Unit Metal-Enamel. Pt. 1.** Jaroslav Chmela. *Korose a Ochrana Materialu,* v. 2, no. 3-4, 1958, p. 38-42.

Stresses effective in cooling after enameling as well as those caused by raised or lowered service temperature. Stresses thought to be dependent on the difference between the expansion coefficients of enamel and metal in temperature changes, thickness of enamel coating, shape of the enameled part, properties of the prime layer of enamel and adhesive strength between enamel and metal.
(Q25k, L27)

1231-Q.* (Dutch.) **Imoprtant Factors in Bonding.** C. Jouwersma. *Metalen,* v. 13, Aug. 30, 1958, p. 284-289.

Study on the build-up of internal stresses during bonding and on external stresses effective, influenced by wetting properties, limits of plastic flow, moduli of elasticity, geometry of the bond. 10 ref. (Q25, K12)

1232-Q.* (Finnish.) **Brittle Fracture of Clean Mild Structural Steel.** J. E. Holmstrom. *Hitsaustekniikka,* no. 2, 1957, p. 29-34, 36, 38, 40, 50.

Effects of temperature, loading rate, thickness of material and heat treatment on the equicohesive temperature. Welding methods have been devised which keep the possibility of brittle failure to a minimum. Welding defects are classified according to importance, in the following order: cracks, penetration defects, reinforcements, edge undercuts, slag lines. It is undesirable to use and weld Thomas steel at temperatures below 0° C., since brittle failure is possible.
(Q26s; CN)

1233-Q.* (French.) **Mechanical Properties of the Light Alloys at Low, Medium and High Temperatures.** M. Tournaire. *Technique et Science Aeronautiques,* no. 6, 1957, p. 273-283.

Although physical properties of light alloys are essentially stable between −75° and +75° C. for long periods of time, at temperatures between 150 and 350° C. these properties change rapidly and precisely according to chemical composition of the alloy as a function of time and temperatures. Tables show tensile properties, fatigue and elastic properties for various compositions at different temperatures. (Q-general, 2-61; EG-a39, Al, Mg)

1234-Q.* (German.) **Structure of Lead Alloys and Creep Strength.** W. Hofman and H. V. Malotki. *Metall,* v. 12, Aug. 1958, p. 695-697.

Experiments on the correlations between structure and creep strength with Sn, Cd, In, Sb, Ti and Cu alloys showed that at a certain grain size the creep rate was a minimum. Rate decreases with increased Cu, Sn. Lead alloys of 0.09 at. % Cd or In and Pb-Sb-As alloys showed least creep speed increase in relation to recrystallization tendency. Recrystallization structures with large differences in grain size showed best creep properties. 18 ref. (Q3, 3-71; Pb-b)

1235-Q.* (Russian.) **Brittleness of Chromium.** S. T. Kishkin and I. O. Panasyuk. *Doklady Akademii Nauk SSSR,* v. 113, no. 6, 1957, p. 1263-1264.

Mechanical properties of Cr as a function of temperature. Low resistance to rupture at room temperature is connected with local distortions in the crystal lattice due to impurities which form interstitial solid solutions with Cr (N, O, H, C and B). Depending on the gas content, the threshold cold brittle temperature for Cr varies in the range 200-800° C. The biggest increase in brittleness of Cr is caused by dissolved N, which can diffuse from gaseous media into Cr on prolonged holding in the range from 700° C. upwards.
(Q26s, 2-61, 3-69; Cr)

1236-Q.* (Russian.) **Static and Cyclic Strength of Metallo-Ceramic Hard Alloys Consisting of Tungsten Carbide and Cobalt.** G. S. Kreymer, A. I. Baranov and O. S. Safonova. *Fizika Metallov i Metallovedenie,* v. 5, 1957, p. 361-364.

Cyclic strength of cobalt-tungsten carbide systems studied as a function of thickness of Co interlayers and as function of plasticity. Tests consisted of bending rotating specimens which were fixed on one side. Tests were based on five-million

loading cycles. Results confirm view that the reduction in plasticity of the Co interlayers with a decrease in thickness leads to a decrease in the strength and thus also to a decrease in the strength of the material as a whole.
(Q27a; W, Co, 6-69, 6-70)

1237-Q. (Russian.) **Internal Friction in Recrystallized Aluminum-Magnesium Alloys.** A. V. Grin'. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 383-384.

Study by the torsional vibration method of the relationship between temperature and internal friction in recrystallized alpha solid solution of Mg in Al for 0.01% Mg, 0.05, 0.5, 1 and 2%. Reduction in the height of the maximum internal friction due to grain boundaries, which occurs when the grain size is increased, together with the effect of Mg on the stress relaxation processes, are explained satisfactorily by the theory of intercrystalline internal adsorption.
(Q22, 2-60; Al-b, *Mg*)

1238-Q. (Russian.) **Internal Friction of Temper-(Hot)-Brittle Steel.** E. I. Kvashnina and V. I. Prosvirin. *Izvestiia Akademii Nauk USSR, Otdelenie Tekhnicheskikh Nauk,* no. 1, 1955, p. 157-159.

Measurements of internal friction of Type-35KHG steel in the ductile and temper brittle conditions. Internal friction was measured by the relative damping of free torsional oscillations in stress cycles of 8, 12 and 14 kg. per sq. mm. Effects of prolonged heating at 500° C., high-temperature heating of the embrittled steel and time of heating for high-temperature annealing followed by heating at 500° C. Data were obtained for comparison on the effect of prolonged heating at 500° C. on VT Mo-steel, in which temper brittleness does not exist. Internal friction of steel 35KHG increases due to the ferrite becoming denuded of carbon. (Q22, Q26s; AY)

1239-Q.* (Russian.) **Creep of Austenitic Steel Under Complex Stress.** I. A. Oding and G. A. Tulyakov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 1, Jan. 1958, p. 3-10.

Tests were made on thin-walled metallic tubes with 0.09% Cr, 0.78% Mn, 0.36% Si, 0.010% S, 0.018% P, 10.68% Ni and 0.47% Ti at 600° C. (with preliminary heat treatment at 1100° C. and cooled in air) to determine creep properties under torsion stress. Experiments did not confirm the theory of directional coincidence of principal tensions and principal axes in deformation under prolonged stress. Observations of creep under complex stress revealed the redistribution of the main creep velocities with the alignment of the creep velocities in the main directions v_1 and v_2 and the creep velocity in a third direction v_3 converging to zero. (Q3; AY)

1240-Q.* (Russian.) **Regularities in the Dependence of Microhardness of Solid Solution Crystals on the Composition of Alloys in Three-Component Systems.** N. N. Glagoleva and V. M. Glazov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 1, Jan. 1958, p. 130-134.

Dependence of microhardness on composition of the solid solution in the systems Al-Mg, Al-Si, Al-Mg-Si, Al-Cu, Al-Cu-Mg, Cu-Zn, Cu-Sn and Cu-Zn-Sn were studied on cross sections with 1:1 weight ratio between alloyed components. The relation of microhardness to composition in transistions from one phase to two-phase system was also studied. Cross sections and the composition of alloys are given at 550° for Al-Mg-Sn and at 500° for Cu-Zn-Sn.
(Q29q, 2-60, M24; Al-b, Cu-b)

1241-Q. (Russian.) **Effect of Shot Peening on the Cavitation Resistance of Metals in Magnetostrictional Vibration Tests.** L. A. Glikman and Yu. E. Zobachev. *Metallovedenie i Obrabotka Metallov,* no. 5, 1957, p. 38-41.

Heat treated specimens of plain (0.4 and 0.55% C) steel and steel 1Kh18N9T and of cast brass LMts-Zh55-3-1 were shot-peened and ground. Effect of peening on cavitation resistance was investigated on a magnetostrictional vibrator in sea-water, at 800 cycles per sec. and amplitudes of 70, 50 and 25. Criterion of cavitation resistance was the loss in weight of specimens after 3-hr. test. It was found that shot peening of the surface and the amplitude of the vibrations did not substantially affect cavitation resistance. (Q9, R2m, G23n; ST, Cu-n)

1242-Q. (Russian.) **Relationship Between Fatigue and Rupture Strength of Alloys at High Temperatures.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov,* no. 6, 1957, p. 17-23.

Specimens of E1617, E1395, E1437 and E1602 studied at 50 cycles per sec. The curves for both strengths, plotted in the same stress-time-to-

failure coordinates, intersect. When testing times are short (200-500 hr.), fatigue of the alloy is more probable; when they are long, creep failure is more common. Studies on the temperature dependences of these two strengths reveal that under the experimental conditions there is a certain temperature below which fatigue, and above which creep, failure is more probable. (Q7, Q3, 2-62; ST)

1243-Q. (Russian.) **Development of the Theory of Metal Fatigue.** I. A. Oding. *Vestnik Akademii Nauk SSSR,* no. 4, 1957, p. 24-30.

A number of fatigue phenomena are explained; directionality of cracking, effect of frequency of cyclic stressing on fatigue strength, and methods of increasing fatigue strength. Function of the stress gradient in fatigue failure, nature of scale factor and observed discrepancies between theoretical and effective concentration coefficients interpreted on the basis of dislocation theory. (Q7)

1244-Q.* (Russian.) **Dynamic Compressibility of Metals Under Pressure From 400,000 to 4 Million Atmospheres.** L. V. Altshuler, K. K. Krupnikov and M. I. Brazhnik. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 34, Apr. 1958, p. 886-893.

Method for determination of pressures and densities of shock compression is based on measurement of velocities of propagation of strong shock waves. Dynamic compressibility of Cu, Zn, Ag, Cd, Sn, Au, Pb and Bi measured in the pressure range from 40,000 to 4,000,000 atm. The highest degrees of compression (2.26 and 2.28 times) were observed in Pb and Bi, elements with the highest atomic volumes. (Q28g, 3-74)

1245-Q.* (German.) **Temper Brittleness in Alloy Steel Castings.** Richard Werner. *Giesserei,* v. 45, Sept. 11, 1958, p. 556-560.

Experiments with test pieces from Cr-Mn, Mn-Si and Cr-Mo steels. Brittleness shown when steels of the first two groups in cooling after tempering were allowed to pass slowly through the range from 540 to 450° C. Therefore, after tempering, water quenching down to between 100° and 200° C.

1246-Q.* (German.) **Pre-stressing Effect on Soft and Medium-Hard Steels.** Hubert Hoff and Georg Fischer. *Stahl und Eisen,* v. 78, Sept. 18, 1958, p. 1313-1320.

Several blown steels of a tensile strength of 30 to 75 kg/mm^2 and two soft, rimming openhearth and basic steel respectively were tension, compression and bend tested. Pre-stressing (Bauschinger) effect increases with tensile strength and disappears in heating at stress-relief temperatures.

1247-Q. Effect of Frequency and Temperature on Fatigue of Metals. S. R. Valluri. *National Advisory Committee for Aeronautics,* Tn 3972, Feb. 1957, 15 p.

Phenomenological considerations applied to a standard-linear-solid physical model indicated that for particular temperatures there are corresponding frequencies of fatigue stressing above which the fatigue behavior changes. (Q7, 2-61)

1248-Q. (Russian.) **Study of Cold Shortness Resistance of Some Steel Compositions.** A. P. Sanina and M. M. Timofeev. *Metallovedenie i Obrabotka Metallov,* Aug. 1958, p. 57-58. (Henry Brutcher, Altadena, Calif., Translation no. 4324.)

Most effective for increasing cold shortness resistance are Mn, Si and Cr. (Q26s, 2-60; AY, *Cr, Mn, Si*)

1249-Q.* Low-Temperature Embrittlement of Austenitic Cr-Mn-N-Fe Alloys. F. W. Schaller and V. F. Zackay. *American Society for Metals, Transactions,* v. 51, Preprint no. 109, 1958, 15 p.

The ductility of austenitic Cr-Mn-N-Fe alloys is studied as a function of test temperature, interstitial content and strain rate. The low-temperature brittleness encountered was explained using a model with strain-induced martensite as the embrittling agent. At high strain rates, an anomalous increase in reduction of area was found and attributed to a localized temperature increase of the specimen. 23 ref. (Q26s, 2-63; SS, *Cr, Mn*)

1250-Q.* Mechanical Properties of Deformed Metastable Austenitic Ultra High Strength Steel. D. J. Schmatz and V. F. Zackay. *American Society for Metals, Transactions,* v. 51, Preprint no. 110, 1958, 13 p.

Austenitic alloy steels containing 0.28 to 0.98% C were deformed at subcritical temperatures and subsequently transformed to martensitic structures. A hardness increase from 2 to 4 points Rockwell "C" was obtained with deformations ranging from 25 to 75% with attendant increases in tensile

strength and yield strength. Yield strengths in excess of 300,000 psi. were obtained by tempering the deformed steels. At this strength level, ductilities of from 6 to 8% were consistently reproduced. Electron micrographs of the deformed steel indicated a refinement of the martensite. 18 ref.
(Q-general, N8, 3-68; AY, SGB-a)

1251-Q.* Mechanical Properties of Fe-Al-Si Alloys at Room and Elevated Temperatures. D. J. Schmatz and V. F. Zackay. *American Society for Metals, Transactions,* v. 51, Preprint no. 111, 1958, 11 p.

Investigation of properties of Fe-Al-Si alloys containing 5 to 9% Al and 0.5 to 2.4% Si. Si increased strength at both room and elevated temperatures. Ductility was markedly decreased by Si and interstitial elements. Si appeared to be more than additive to Al in improving oxidation resistance. Si raised order —disorder temperature and was additive to Al in initiating long-range order. Correlation between ordering temperature as determined by electrical resistivity and creep rate was noted. 9 ref. (Q-general, 2-60, 2-61, P15g; Fe-b, *Al, Si*)

1252-Q.* A Compilation and Interpretation of Cyclic Strain Fatigue Tests on Metals. J. F. Tavernelli and L. F. Coffin, Jr. *American Society for Metals, Transactions,* v. 51, Preprint no. 112, 1958, 13 p.

Cyclic-strain fatigue data from several investigators and the author's studies are compiled and interpreted from a plastic strain range point of view. The relationship $N^{1/2}\Delta\varepsilon_p = C$ best fits all the available data regardless of the metals tested, the temperature of testing and the manner of testing. Here N is the number of cycles to failure, $\Delta\varepsilon_p$ the plastic strain range, and C a constant. The significance of the fracture ductility to low-cycle fatigue is also discussed. When the fracture strain value is placed on the fatigue curve at $N = \frac{1}{4}$, good agreement results, thus giving a very simple method for predicting the fatigue behavior of the metal. 8 ref. (Q7, 1-54)

1253-Q.* The Effects of Microstructure and Heat Treatment on the Hydrogen Embrittlement of Alpha-Beta Titanium Alloys. D. N. Williams, F. R. Schwartzberg and R. I. Jaffee. *American Society for Metals, Transactions,* v. 51, Preprint no. 113, 1958, 13 p.

Four alpha-beta Ti alloys examined to determine the effects of heat treatment, alpha grain size and alpha grain shape on the amount of hydrogen required to induce low strain rate embrittlement (for example, their hydrogen tolerance). The tolerance was markedly dependent upon heat treatment, decreasing as the heat treatment temperature was lowered. Strength level did not appear to affect the hydrogen tolerance significantly. Increased alpha grain size decreased the hydrogen tolerance as did acicular grain shape. Strain-induced hydride was observed in a number of specimens and a tentative relationship between impact embrittlement, strain-induced hydride and low strain rate embrittlement was developed. Alloys were classified from most to least resistant to hydrogen embrittlement in the following order: Ti-6Al-4V, Ti-4Al-4Mn, Ti-8Mn, and Ti-2Mo-2Fe-2Cr. 9 ref. (Q26s, 2-64, 3-71; Ti-b)

1254-Q.* Properties of As-Cast and Heat Treated 2% Moybdenum-Uranium. E. G. Zukas. *American Society for Metals, Transactions,* v. 51, Preprint no. 115, 1958, 6 p.

Tensile and impact properties were determined for 2% Mo-U alloys from −198 to 100° C. after the following heat treatments: (a) as-cast, (b) water quenched from 850° C., (c) water quenched from 850° C. followed by aging at 450° C. for 1 hr., (d) homogenized and furnace-cooled, and (e) water quenched from 625° C. The tensile strengths reached a maximum at temperatures below −30° C. This temperature was influenced by heat treatment. Tensile and yield strengths well over 200,000 psi. were obtained by treament (c) but the alloy was quite brittle after this treatment. Impact strengths were generally low, especially below −30° C. A homogenization treatment followed by furnace cooling appeared to be a satisfactory and practical heat treatment. 5 ref.
(Q27a, Q6n, 2-64; U-b, *Mo*)

1255-Q.* Applications and Properties of Nodular Cast Iron. A. D. Main. *Castings,* v. 4, Aug. 1958, p. 9-21.

Properties of nodular cast iron; examples illustrate applications arising from these properties. 6 ref. (Q-general, 17-57; CI-r)

1256-Q.* Effect of Alloying Elements on Creep Behavior. J. Glen.

Iron and Steel Institute, Journal, v. 190, Oct. 1958, p. 114-135.

A simple theory is developed to explain transitions in creep rate and to show the effect of stress and temperature. Proof of this theory is given by the results of many creep tests on steel. The effects of N, C, Mn, Cr, Mo, V, Ti and Si as alloying elements. Results of creep tests on austenitic alloys and Ti alloys show that transitions in creep rate are a common occurrence in most commercial alloys. 34 ref. (Q3; 2-60; AY)

1257-Q.* Recent Developments in Creep Testing by the Cantilever Bending Method. G. T. Harris, H. C. Child, A. B. Collier and C. F. West. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 136-143.

Cantilever creep units are capable of carrying out tests at temperatures up to 1200° C., at stresses of from 50 psi. to 50 tons per sq. in. with a sensitivity of strain measurement of from 1 to 3 $\times$ 10^{-6}. Several suitable applications of these units are exemplified. Satisfactory correlation of cantilever creep data with tensile data is possible. 4 ref. (Q3, 1-54)

1258-Q.* Effect of Cold Work on the Fatigue Characteristics of an Austenitic Alloy Steel. B. Cina. *Iron and Steel Institute, Journal*, v. 190, Oct. 1958, p. 144-157.

The limited beneficial effect of static cold work on the fatigue limit in alternating stress has been found to be due to the operation in the fatigue limit of a Bauschinger effect. A much greater benefit from cold work was obtained for pulsating tensile than for alternating stress. Light tempering after static cold work failed to raise the fatigue limit in alternating stress. 28 ref. (Q7a, 3-68; SS, *Mn, Ni*)

1259-Q.* Microhardness Testing. Vincent E. Lysaght. *Tool Engineer*, v. 41, Oct. 1958, p. 87-90.

Microhardness testing techniques provide accurate quality control for applications where conventional hardness testing equipment cannot be used. Examples are thin materials, plated coatings, small diameter wire and small precision parts. It is used to determine hardness gradients in superficially hardened surfaces, for exploring hardness variations over small areas, for determining the hardness of different alloy constituents. Microhardness testers fall into two general groups: those based on the scratch method and those operating on the indentation principle. (Q29q)

1260-Q.* (German.) Steel Castings With Special Properties. Ju. A. Nechendsi. *Freiberger Forschungshefte*, v. B24-3, July 1958, p. 19-46.

Wear resistance, heat resistance, corrosion resistance, magnetic and nonmagnetic properties; use for tools. (Q9, Q-general, 2-62, R-general, P16; ST, 5-60)

1261-Q.* (German.) Elastic Residual Stresses in Case Hardened and Nitride Hardened Steel Parts Detected With X-Rays. Helmut Hasenmeier. *Harterei-Technische Mitteilungen*, v. 12, no. 2, 1958, p. 23-37.

Stresses tested by X-ray diffraction. Best results obtained with an X-ray tube with Cr anode. To obtain pure K alpha-ray diagrams, a monochromator is used. By progressive electrolytic or chemical etching stresses in different depths could be examined.
(Q25h, 1-53, M22g, J28; ST)

1262-Q.* (German.) Long-Time Stress Testing in Multiple Instruments Above 500° C. Pt. 2. H. Wiegand. *Metall*, v. 12, Sept. 1958, p. 803-810.

Elongation tests with heat resistant materials. Testing instrument and furnace; preparation of samples, torsional stress resulting from the fastening in the specimen holders; distribution of hardness in machined notches. 10 ref.
(Q3, 17-53, Q29; SGA-h)

1263-Q.* (Russian.) Micro-Heterogenous Deformation of Metals While Being Heated at High Temperatures. M. G. Lozinskii, M. B. Guterman and E. I. Antipova. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 6-9. (Henry Brutcher, Altadena, Calif., Translation no. 4245.)

Effect of high temperature and stress on flow characteristics of specially prepared metallic samples; definite local displacement found. To facilitate measurement of deformation, a pattern of indentations was made on the polished surface of the samples by a diamond point. After subjecting the samples to heat and stress the pattern was photographed. Displacement seems to be related to surface curvature of individual grains. 5 ref.
(Q24, 2-62)

1264-Q.* (Russian.) **Effect of Plastic Deformation on Heat Resistance of Alloy No. EI437.** S. T. Kishkin, A. A. Klypin and A. M. Sulima. *Metallovedenie i Obrabotka Metallov,* June 1958, p. 18-21. (Henry Brutcher, Altadena, Calif., Translation no. 4248.)

Plastic deformation exerts considerable influence on the durability of dispersion-hardening alloys such as EI437, greatly reducing it at 700-800° C. It is associated with the acceleration of basic dispersion processes resulting from lowering of tensile strength. At lower temperatures, when dispersion is retarded, grains break down into blocks, while at higher temperatures tensile strength is reduced. Fracture usually takes place near grain and twin boundaries. 5 ref.
(Q-general, 2-62, 3-68; Ni-b, SGA-h)

1265-Q.* **Raising Working Temperature of Steam Turbine Flat Spring Seals to 640°.** T. I. Volkova. *Metallovedenie i Obrabotka Metallov,* v. 4, June 1958, p. 21-25. (Henry Brutcher, Altadena, Calif., Translation no. 4249.)

According to technical requirements the springs were to maintain resilience under a load of 12 kg. per sq. mm. after an exposure to 585-640° for 10,000 hr. Several Soviet and foreign austenitic and Ni steels were tested. Mechanical properties, chemical composition and test results tabulated. (Q27a, Q23p, 2-62, T7c, 17-57; SS, AY, *Ni*)

1266-Q.* (Russian.) **Heat Resisting Properties of Copper-Chromium and Copper-Nickel Alloys.** A. P. Simakovskii. *Metallovedenie i Obrabotka Metallov,* June 1958, p. 41-47. (Henry Brutcher, Altadena, Calif., Translation no. 4253.)

While it is known that Cu is a corrosion resistant metal it is not sufficiently heat resistant above 250°. Cr raises heat resistance of Cu. Bars made up of Cu alloy containing Cr and Ni, respectively, as well as other elements, were subjected to extensive physical tests. Based on the results of these tests the Cu-Ni alloy no. MN5 is recommended for wide range of applications. 4 ref.
(Q-general, 2-62; Cu-b, *Cr, Ni*)

1267-Q. Electromagnetic Vibrators. *Iron and Steel,* v. 31, Oct. 1958, p. 504-506.

Use in creep and fatigue tests over a wide range of temperatures. (Q3, Q7, 1-53)

1268-Q. Strength Reduction of Metallic Single Crystals Due to Adsorption and Spontaneous Dispersion in a Liquid Medium. P. A. Rebinder. *Doklady Akademii Nauk SSSR,* v. 111, no. 6, 1956, p. 1278-1281. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB4.)

(Q27a, P13; 14-61)

1269-Q. Influence of Phosphorus on Properties and Structure of Gray Cast Irons. M. Ferry. *Fonderie,* no. 121, Feb. 1956, p. 55-66. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 827.)

(Q-general, 2-60; CI, *P*)

1270-Q. Use of Yield and Fracture Under Multiaxial Stress. K. Matthaes. *Metallwissen und Technik,* v. 10, no. 17-18, p. 795-800. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB29.)

(Q26; ST, 3-66)

1271-Q. Investigations Into Damping in Annealed or Cold Rolled Alpha Iron in the Presence of Small Additions of Carbon and Nitrogen. W. Koster. *Publications de l'Association des Ingenieurs de la Faculte Polytechnique Mons,* no. 3, 1956, p. 1-13. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB43.)

(Q8; Fe, *C, N*)

1272-Q. Elimination of High Brittleness in Hot Rolled Transformer Sheet. V. A. Koreleva and M. I. Sherstyuk. *Stal',* v. 16, 1956, p. 545-548. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB95.)

Previously asbstracted from original. See item 788-Q, 1956.
(Q26s, N8, J23; SGA-n)

1273-Q. Electrical Resistance and Plastic Deformation of Metals. H. G. Van Buren. *Zeitschrift für Metallkunde,* v. 45, no. 4, 1955, p. 272-281. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-6G8G.)

(Q24, P15g)

1274-Q. (Russian.) **Determination of Hardness by Scratch Test.** V. K. Grigorovich. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1007-1012.
7 ref. (Q29d)

1275-Q. (Russian.) **Determination of Mechanical Properties of Steel by Measurement of Its Coercive Force.**

B. S. Natapov and E. S. Fal'kevich. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1013-1014.

4 ref. (Q-general, P16; ST)

1276-Q. (Russian.) **Study of Inclination of Steel to Brittleness Under Industrial Conditions.** E. M. Shevandin. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1017-1024.

Relation between changes in dimensions of steel (length, thickness, etc.) and brittleness. Bend tests were made on structural steels. 14 ref. (Q26s, Q5, P10d; ST)

1277-Q. (Russian.) **New Hardness Number and Mechanical Properties of Steel.** M. S. Drozd. *Zavodksaya Laboratoriya,* v. 24, no. 8, 1958, p. 1002-1007.

Results of testing of many grades of steel with hardness H_B from 95 to 498 kg. per sq. mm. 8 ref. (Q29n; ST)

1278-Q. (Russian.) **Use of Radioactive Isotope Method in Study of Wear Resistance of Metals.** D. G. Tochil'nkov. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 965-971.

Marked atoms are used for investigating wear resistance of metals and metal coatings by studying their preliminary activation in the surface of the test specimen. (Q9, 1-59)

1279-Q. (Spanish.) **Three Key Figures in the Classification of High-Grade Construction Steels.** Rafael Calvo. *Instituto del Hierro y del Acero,* v. 11, Apr-June 1958, p. 97-103.

Hardenability, martensite transformation temperature and temperability as criteria; factors that influence these characteristics. (Q-general, J5, N8p; ST)

1280-Q.* **Spiral Bending Test for Electrodeposited Coatings.** J. Edwards. *Institute of Metal Finishing, Bulletin,* v. 8, Summer 1958, p. 101-106.

Method of measuring ductility. Plated strip is bent round a former in the shape of an equiangular (logarithmic) spiral and the radius of curvature at which the coating cracks is read off directly from graduations on the former. The percentage elongation at this point is calculated from radius of curvature and the thickness of plated strip. (Q5, 1-54; 8-12)

1281-Q. Some Principles for Developing Alloys Based on Borides of High-Melting Metals. K. I. Portnoi and G. V. Samsonov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 7, 1958, p. 140-141. (Henry Brutcher, Altadena, Calif., Translation no. 4344.)

Basic principles useful as guides in developing high-temperature alloys based on borides of refractory metals. Factors determining mechanical strength and plasticity; high-temperature strength; scaling resistance; thermal fatigue. (Q-general, 2-62; EG-d37, *B*)

1282-Q. (Czech.) **Effect of Arsenic on the Properties of Steel.** F. Benes. *Hutnické Listy,* v. 12, no. 1, 1957, p. 85-96.

Effect of 0.01-0.27% As on the properties of low-carbon (0.1% C), high-carbon (0.7% C), Cr-Mn-Si-Cu and Cr-Ni-W-Cu steels. As increases tensile and yield strength and decreases elongation and impact value of steel with 0.1% C, and hardly affects the properties of steel with 0.7% C. In alloy steels heat treated for high stability, it does not affect yield strength but decreases impact value. (Q-general, 2-60; AY, *As*)

1283-Q.* (French.) **Influence of Polygonization on the Mechanical Properties of Aluminum-Zinc Solid Solutions.** P. Gobin and J. Montuelle. *Comptes Rendus,* v. 247, July 28, 1958, p. 456-458.

Whereas polygonization almost completely prevents structural hardening of Al-Zn alloys after air quenching at 20° C., it only diminishes hardening after water quenching at 16° C. It also renders the alloy less sensitive to effect of a static stress slightly lower than the elastic limit; hence, polygonization acts as a stabilizing factor. (Q24, Q-general; Al, Zn)

1284-Q. (Russian.) **Optimum Chemical Composition of Type 1KH18N9T Stainless Steel.** M. I. Vinograd. *Metallurg,* no. 5, 1957, p. 13-16.

Limits for C and alloy content. Study of a large number of casts has shown that to obtain steel with small percentages of alpha-phase and not sensitive to intercrystalline corrosion, it is advantageous to specify different Cr, Ni and Ti contents for the steel, according to whether it is intended for tube or for plate. (Q-general, R2h, 2-60; SS)

1285-Q. (Rumanian.) **Properties of Low-Alloy Manganese-Molybdenum**

Steel for Structural Purposes. B. Rotenstein. *Studii si Cercetari Metallurgie,* v. 1, no. 2, 1956, p. 261-282.

Influence of Mn, Cr, Mo, Cu and C on mechanical properties (tensile strength, Rockwell hardness, impact value) and microstructure of 11 Mn-Mo steels; also on hardenability, reversible temper, brittleness, corrosion resistance and weldability. Low-alloy Mn-Mo steel with small additions of Cu and Si possesses sufficiently high mechanical properties and improved corrosion resistance and can be used as a substitute for Cr-Ni and Cr-Mo steels. (Q-general; AY, SGB-s, *Mn, Mo*)

1286-Q. (Russian.) **Increase in Durability of Cast Steel Propellers Using 1Kh14ND Stainless Steel.** A. M. Veingarten, M. L. Rozen, N. N. Sokolov, K. P. Lebedev, E. N. Liberman and E. K. Remizova. *Sudostroenie,* no. 3, 1957, p. 36-40.

Microstructural, mechanical and corrosion resisting properties of cast stainless steel containing C 0.05, Si 0.06, Mn 0.42, Cr 13.5, Ni 1.5, Cu 1.37, S 0.014, P 0.018, after various heat treatments. As quenched, the microstructure consists of coarse acicular martensite, with Cr-rich ferrite along the austenite grain boundaries. The best combination of strength and ductility is obtained after quenching in air from 1000-1050° C. and tempering at 680-700° C. The cooling rate after quenching and tempering has no noticeable influence on mechanical properties. (Q-general, M27, 2-64; SS)

1287-Q. (Russian.) **Mechanical Properties of Steel 55C2 at High Temperatures.** V. K. Prourzin. *Trudy Donetskogo Industrialnogo Instituta,* v. 19, no. 5-7, 1957, n.p.

To find the optimum rolling temperature for steel 55C2 the effect of temperature within the limits 20-1100° on tensile strength, yield strength and elongation was studied. Samples were quenched in oil from 860° and then annealed at 400° for 1 hr Tensile strength hardly changes up to 500°, but then drops sharply. In the range 820-900°, a halt in the drop of yield strength is observed, which is connected with recrystallization and change in grain size. (Q27a, 2-62, F23; ST)

1288-Q. (Slovenian.) **Replacement of Nickel by Other Alloying Elements in Standard Structural Steels.** Vasilij Terseglav. *Nova Proizvodnja,* v. 7, no. 6, 1956, p. 362-370.

Comparison of mechanical properties of Cr-Ni steels with Cr, Cr-Mo and Cr-Ni-Mo steels after various forms of heat treatment shows that it is possible to replace a number of steels containing from 1.5 to 4.5% Ni by lower alloy steels by additions of Mo.
(Q-general, 2-60; AY, *Ni, Mo,* SGB-s)

1289-Q.* Grain-Size and Its Influence on the Properties of Metals and Alloys. K. Camenisch. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 589-594. (From *Pro-Metal,* v. 9, Aug. 1956, p. 699-702.)

Previously abstracted from original. See item 925-Q, 1956.
(Q24, J23, M27)

1290-Q. (Czech.) **Effect of Some Factors on the Relaxation of Materials at High Temperatures.** Z. Lubomir. *Hutnické Listy,* v. 12, no. 4, 1957, p. 335-342.

Effect of temperature, initial stress and heat treatment on relaxation characteristics of metals at high temperatures, study of effect of surface coatings of Cr, Cr-Al and S on relaxation characteristics of Cr-W-V steels. The Oding method on ring specimens was employed. Surface layers produced on steel by impregnation do not appreciably affect relaxation. (Q3, AY)

1291-Q. (Russian.) **Effect of Thermomechanical Treatment on the Temper Brittleness of Alloy Structural Steels.** E. N. Sokolkov and L. V. Smirnov. *Metallovedenie i Obrabotka Metallov,* no. 3, 1957, p. 31-35.

Effect of combining hot plastic deformation with tempering in conditions which excluded the recrystallization of cold worked austenite as a cause of the tendency to reversible temper brittleness of 37XH3A, 35XGCA and 40XH4 steels. Samples of 37XH3A steel were heated to 1000°, cooled to 900°, rolled and tempered. Some of the samples were tempered without rolling. Testing of impact value after annealing in the range 200-650° showed that the combination of plastic deformation with tempering suppresses to a considerable extent the development of temper brittleness, eliminating fracture along the austenitic grain boundaries. (Q26s, Q24, J29; AY)

1292-Q. (Russian.) **Ductility of Cold Rolled Transformer Steel.** A. G.

Petrenko, A. V. Smirnova and L. A. Kurtova. *Stal'*, no. 5, 1957, p. 453-456.

Study of the structure showed that ductility is determined by the amount and form of the carbide phase. Coarse precipitates of carbide phase appear along the boundaries and inside the grains in specimens of low-ductility metal and there is also a zone of a eutectoid type of separation. In specimens which have received a great amount of bending, the amount of precipitated carbide phase is considerably less and the main mass is disposed within the grains as globules. Repeated annealing of the brittle metal at 750-850° decreases the amount of carbide phase and raises the ductility sharply.
(Q23p, N8r; AY, SGA-n)

1293-Q. (Russian.) **Properties of 20-XGP Steel.** N. I. Letchford. *Stal'*, no. 6, 1957, n.p.

Substitution for 20XHM of a cheaper steel not containing scarce elements did not result in a lowering of resistance to wear and stability of the components, but enabled the carburization process to be accelerated by 10-12% and did away with the need for high-temperature tempering after normalization of forgings. 20XGP steel, deoxidized by Ti, is prepared with a grain size of 6-7, and has tensile strength of 100 kg. per sq. mm., yield strength 80 kg. per sq. mm., elongation 9%, impact value 8 kg. per sq. cm.
(Q-general, 2-60; AY)

1294-Q. (Russian.) **Heat Resistant Cast Iron.** P. I. Durasov, B. S. Mil'man and N. A. Aleksandrov. *Standartizatsiya*, no. 2, 1957, p. 58-61.

Heat resistant alloy cast iron has been widely adopted. Composition is: Cr 0.3-0.5; Si 4.5-6.5 and Cr 0.5-1.5, Ni 14.0-17.0, Cu 6.0-8.5 and Cr 1.5-2.5. Silicon heat-resistant cast iron with spheroidal graphite has best heat resistant and mechanical properties. Spheroidal graphite is provided by treatment with Mg.
(Q-general, 2-62; CI-r, CI-q; *Si*)

1295-Q. (Russian.) **Properties of EI-257 Steel After 20,000 Hours in Service.** T. A. Mikhailova. *Teploenergetika*, no. 3, 1957, p. 41-44.

Structure and properties of EI-257 steel, used in the steam tubes of a uniflow boiler working at 600° and at a pressure of 300 atm. Composition of the steel after 20,000 hr. of service was C 0.11, Mn 0.33, Si 0.42, Cr 13.65, Ni 12.0, W 2.5, Mo 0.68. Metallographic tests of base metal and welded joints were made, together with mechanical and corrosion tests. Results are related to the specified period of service of the metal after 3000, 7500 and 14,000 hr. Standard boiling tests showed no decrease in the susceptibility of the steel to intercrystalline corrosion after 20,000 hr. service.
(Q-general, R4; SS)

1296-Q. (Russian.) **Resistance of Metastable Nitride Phases to Wear and Corrosion.** P. L. Gordienko and A. V. Smirnov. *Trudy (Leningradskii Institut Aviatsionnogo Priborostroeniya)*, no. 22, 1957, p. 23-28.

Specimens of technically pure Fe were nitrided and subsequently quenched under various conditions to obtain the nitride phases on the surface, and then tested for wear and corrosion in a 3% solution of NaCl. Tests indicate that a mixture of nitride austenite and nitride martensite had little resistance to omega, the martensite being the more resistance and the beta phase less resistant than martensite.
(Q9, R6j, 2-64; ST)

1297-Q.* **Progress in Zirconium Technology.** *Nuclear Technology Briefs: Reactor Core Materials*, no. TI-10, Sept. 25, 1958, 9 p.

Corrosion resistance, high-temperature tensile properties and creep characteristics of Zr and Zircaloy 2 and effect of neutron irradiation on mechanical properties. Use of Zr and Zr alloys in nuclear power reactors. (Q-general, R-general, 2-67, T11, 17-57; Zr)

1298-Q.* **Tensile Properties and Rolling Textures of Niobium Sheet.** F. J. Anders, Jr. and W. I. Pollock. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 60-65.

Room-temperature tensile properties and hardness of Cb sheet correlated with impurity content, annealing temperature and microstructure. Rolling texture for cold rolled and recrystallized sheets. Behavior is similar to alpha iron in both tensile tests and rolling texture. 9 ref.
(Q27a, Q29n, M26c; Cb, 4-53)

1299-Q.* **The Ductile-to-Brittle Transition in Niobium.** E. T. Wessel and D. D. Lawthers. Paper from

"Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 66-76.

Study of deformation and fracture characteristics of commercially pure Cb with particular emphasis on the ductile-to-brittle transition; influence of strain rate, microstructure and impurity content on temperature range of transition. For materials investigated the transition occurred in range of −100 to −200° C. and apparently was not affected by variations in impurity level. 23 ref. (Q23r; Cb)

1300-Q.* The Effect of Rare Earth Metal Additions on the Ductility of Arc-Melted Group Va Metals. J. W. Semmel, Jr. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 77-80.

Semipure V, Cb, and Ta were arc-melted with rare earth metal additions, producing relatively soft alloy buttons which were cold rolled successfully. Under similar conditions but without the rare earth metal additions, these metals were hard and could not be cold rolled. A Cb-Ce alloy was considerably stronger than commercial ductile Cb. 4 ref.
(Q23p, C5h, 2-60, Cb, Ta, *EG-g*)

1301-Q.* (Japanese.) **Effect of Surfaces on the Strength of Metals.** M. Terasawa. *Metals,* v. 28, Oct. 1958, p. 746-751.

Well-finished metal shows high creep limit but if not well finished it fails on repeated stress and bending. This is especially so in the resistance of steel to repeated strain. However, nitrated steel is not affected much by unevenness.
(Q27a, 3-70; ST)

1302-Q. (Russian.) **Effect of Mercury on the Strength and Durability of Structural Materials.** G. V. Karpenko, A. I. Yatsyuk and F. P. Yanchishin. *Nauchnye Zapiski Instituta Mashinovedeniya i Automatiki (Akademiya Nauk USSR). Seria Mashinovedeniya,* v. 6, 1957, p. 42-49.

Effect of Hg amalgamation on the mechanical properties of steel, brass and duralumin. Liquid Hg significantly lowered the tensile strength of brass test pieces (by 32%) while that of duralumin fell by 12%. The elongation figure of brass and duralumin fell to 0. Liquid Hg showed no effect on ground steel 30Kh, or on Cu. Endurance under cyclical load test was sharply reduced.
(Q-general; ST, Cu-n, Al-b, *Hg*)

1303-Q. (Russian.) **Mechanical Properties of Cast Rhenium.** E. M. Savitskii and M. A. Tylkina. *Trudy Instituta Metallurgii Akademii Nauk SSSR,* v. 1, 1957, p. 158-161.

Re castings were obtained by melting baked metal powder in an argon-arc furnace. Tests in the temperature range from − 194 to +1150° showed that Rockwell hardness changes from 400 to 134 kg. per sq. mm. Ductility at 20 and 1000° determined. Cold working increases hardness by about 80%. Temperature of start of recrystallization is about 1500°. 7 ref.
(Q-general, N5; Re)

1304-Q. (Russian.) **Influence of Temperature on the Mechanical Properties of Alkaline Earth Metals.** E. M. Savitskii and V. F. Terekhova. *Trudy Instituta Metallurgii Akademii Nauk SSSR,* v. 1, 1957, p. 162-169.

Strength, hardness and ductility in tension of Mg, Ca, Sr and Ba investigated in the temperature range 20-800°. With regard to decrease in strength and hardness at 20° the metals can be arranged in the following order: Mg, Ca, Sr, Ba. On raising the temperature to 550° their hardness and strength become equal. The change of mechanical properties with temperature proves the presence of two polymorphous phases in Ca and Sr.
(Q-general, 2-61; Mg, Sr, Ca, Ba)

1305-Q. (Russian.) **Problem of Improving the Quality of Rails.** O. N. Uskova. *Zheleznodorozh Transport,* no. 2, 1957, p. 40-44.

Failure of rails R50 and R65 is due to defects resulting from contact stresses and also from nonmetallic inclusions. Quality of rails could be raised both by quench hardening and alloying and by improving melting technique.
(Q-general, J26, D9, T23q; ST)

1306-Q. The Structure of Steel. Edwin Gregory and Eric N. Simons. *Edgar Allen News,* v. 37, Aug. 1958, p. 174-176.

(Q28, Q29, Q6, Q5, P10d; ST)

1307-Q. Toughen Mild-Carbon Steels With Columbium. *Iron Age,* v. 182, Oct. 30, 1958, p. 96.

(Q-general; CN-b, *Cb*)

1308-Q. Friction as Resistance to Shear of Thin Surface Layers on

Solids. G. I. Epifanov. *Doklady Akademii Nauk SSSR,* v. 114, no. 4, 1957, p. 764-767. (Henry Brutcher, Altadena, Calif., Translation no. 4327.)

New method of study of sliding friction between clean metal surfaces entailing the use of freshly cut surfaces and high normal stresses to preclude any contaminating surface films. (Q9p)

1309-Q. Generalized Creep Criteria Diagram Based on New Relationships Among Stress, Creep Rate and Service Life. I. A. Oding and V. S. Ivanova. *Issledovaniya Po Zharoprochnym Splavam,* v. 1, 1956, p. 52-59. (Henry Brutcher, Altadena, Calif., Translation no. 4235.)

More accurate relations among stress, creep rate and time to failure permit a linear extrapolation of the results of short-time (2000 hr. and less) rupture tests to long periods (of the order of 10,000 or 100,000 hr.). (Q3)

1310-Q. Influence of Alloy Components on the Hardness of Nickel Alloys at High Temperatures. M. E. Blanter. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 12, 1956, p. 88-95. (Special Libraries Assoc., Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB45.)

(Q29n, 2-62; Ni-b)

1311-Q. Determination of Cutting Performance of Tungsten Carbide With Cobalt and/or Nickel as Binders. N. F. Kazakov and M. N. Andrianova. *Stanki i Instrument,* no. 5, 1957, p. 24-25. (Henry Brutcher, Altadena, Calif., Translation no. 4334.)

Previously abstracted from original. See item 134-Q, 1958.
(Q9n, T6n; W, *Ni, Co,* 6-69)

1312-Q. (Czech.) **Internal Friction in Austenitic Steels.** J. Vodsedalek. *Strojirenstvi,* v. 6, no. 11, 1956, p. 757-762.

Damping properties, over a wide range of loads and working temperatures, of heat resisting steels, based on Fe with additions of Cr, Ni, Co, used as steam turbine blade materials. Problems of fatigue strength at high temperatures and effects of initial amplitude of vibration, prolonged cyclic and static stress conditions. Mechanism of damping of vibrations in austenitic steels is connected with the formation and migration of dislocations and the formation of new phases.
(Q22; SS, *Cr, Ni, Co*)

1313-Q. (German.) **Evaluation of Notch Impact-Bending Tests.** G. Schutz. *Fertigungstechnik,* v. 8, Sept. 1958, p. 413-417.

Tables for fast and precise determination of impact strength. (Q6)

1314-Q. (Russian.) **Procedure for Fatigue Testing at Variable Load Conditions.** D. N. Reshetov and S. A. Shuvalov. *Vestnik Mashinostroeniya,* v. 38, Sept. 1958, p. 3-7.

Since the majority of machine parts operate under continuously variable load conditions and changing amplitude, fatigue test was devised for industrial conditions where load varies every 30 sec. 10 ref. (Q7)

1315-Q. Strength of an Alloy Containing Zones. A. Kell and M. E. Fine. Northwestern University Dept. of Metallurgy. *U. S. Office of Technical Services,* PB 124768, Dec. 1956, 10 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

Rough estimates of the stress necessary to force dislocation through a Guinier-Preston zone in an Al alloy containing 2 at.% Cu and in an Al alloy containing 13 at. % Ag. Suggested that the process of shearing the zones determines the initial flow stress in these age-hardening alloys. (Q24, N7a; Al-b)

1316-Q. Delayed Yielding in a Substitutional Solid Solution Alloy. L. A. Shepard and J. E. Dorn. California University, Institute of Engineering Research. *U. S. Office of Technical Services,* PB 125561, Feb. 1956, 36 p. (Available at Library of Congress, Washington D. C.—Microfilm $3; Photostats $6.30.)

Effect of temperature and stress on the delayed yielding arising for substitutional locking of dislocations in the face-centered cubic system. Specimens of an Al alloy containing 2% Mg were prestrained to 25,000 psi. at 78° K. and then aged for 15 min. at 273° K. to develop a pronounced yield point at 78° K. Delayed yielding tests were performed at 78 and 114° K. at a series of constant stresses below the upper yield point observed in a tensile test. The delay time for yielding was found to depend on the product of two separable functions of stress and temperature.
(Q24c; Al-b, *Mg*)

1317-Q. Activation Energies for Creep of High Purity Aluminum. O.

D. Sherby, J. L. Lytton and J. E. Dorn. California University, Institute of Engineering Research. *U. S. Office of Technical Services,* PB 125935, Apr. 1956, 27 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Activation energies for creep of high-purity Al were obtained over the temperature range from 77 to 880° K. by rapidly changing the temperature during creep at constant stress. The experimentally obtained activation energy was shown to be insensitive to stress and strain. From 500 to 880° K. the activation energy for creep was found to be independent of temperature and equal to 35,500 cal. per mole which is the same as that for self-diffusion of Al. (Q3, P13a; Al-a)

1318-Q. Survey of the Recovery of Damping and Modulus Changes Following Plastic Deformation. Akira Hikata and Andrew Granato. Brown University, Metals Research Laboratory and Graduate Div. of Applied Mathematics. *U. S. Office of Technical Services,* PB 125954, Jan. 1957, 27 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

Measurements of changes in attenuation and elastic constants with time following plastic deformation compared with results of a theory which assumes these changes are a result of dislocation pinning by deformation-induced point defects. A check of the temperature dependence is afforded by recovery measurements of Young's modulus for Cu. (Q24, Q8; Cu)

1319-Q. Statistical Formulation for Creep of Metals. J. Lambert Bates, Taikyue Ree and Henry Eyring. Utah University, Institute for the Study of Rate Processes. *U. S. Office of Technical Services,* PB 125970, June 1956, 37 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3; Photostats $6.30.)

A reasonable physical explanation of flow processes is found by use of tensile data. Parameters in the creep equation for a large number of metals and alloys evaluated. (Q3)

1320-Q. Effect of Porosity on Mechanical Properties of Metals and Alloys. Vincent DePierre. Naval Gun Factory. *U. S. Office of Technical Services,* PB 126018, May 1956, 13 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Porosity has a deleterious effect on tensile strength, yield strength, elongation, impact and fatigue strength. Tensile strength and ductility are seriously lowered by small percentages of porosity. Yield strength is only slightly affected. (Q-general, 3-71, 9-68)

1321-Q. Tensile Properties of Zone-Refined Iron in the Temperature Range From 298 to 4.2° K. R. L. Smith and J. L. Rutherford. Franklin Institute, Laboratories for Research and Development. *U. S. Office of Technical Services,* PB 126111, Sept. 1956, 49 p. (Available at Library of Congress, Washington, D. C.— Microfilm $3.30; Photostats $7.80.)

The higher the purity, the lower the flow stresses and the better the low-temperature ductility. Yield stresses as low as 3800 psi. have been observed at room temperature and elongations of 10% have been observed at 4.2° K. The major portion of the ductility at 4.2° K. arises from twinning. Deformation by twinning at 4.2° K. is not suppressed by prestraining at room temperature and the twins occur all through the test. (Q27a, 2-63; Fe-a)

1322-Q. Engineering Application of the Absolute Rate Theory to the Creep of Cast Magnesium. Mervin B. Hogan. Utah University, Institute for the Study of Rate Processes. *U. S. Office of Technical Services,* PB 126152, Apr. 1955, 46 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Experimental data analyzed in terms of a four-element mechanical model as an analogue, in conjunction with the absolute rate theory. (Q3; Mg-b)

1323-Q. Elastic Constants of Magnesium and Magnesium Alloys. T. R. Long. Case Institute of Technology. *U. S. Office of Technical Services,* PB 126172, Jan. 1956, 26 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.70; Photostats $4.80.)

The adiabatic elastic constants of single crystals of Mg and dilute alloys of Mg with Ag, In and Sn measured by the ultrasonic pulse echo technique. Specific values given. (Q21; Mg-b)

1324-Q. Bending of Coated Zinc Crystals. L. C. Weiner. Columbia University, School of Engineering. *U. S. Office of Technical Services,* PB 126293, Aug. 1957, 5 p. (Available at Library of Congress, Washington, D. C.—Microfilm $1.80; Photostats $1.80.)

(Q24; Zn, 14-61)

1325-Q. Arc-Cast Molybdenum Base Alloys. M. Semchyshen and R. Q. Barr. Climax Molybdenum Co. *U. S. Office of Technical Services,* PB 126447, 1955, 435 p. (Available at Library of Congress, Washington, D. C. —Microfilm $11.10; Photostats $63.30.)

Deoxidation and hot plasticity; mechanical properties of wrought alloys; effect of variation in strain hardening on mechanical properties and recrystallization temperature; embrittlement resulting from exposure to elevated temperature; coatings for protection of Mo against oxidation. (Q-general; Mo-b)

1326-Q. V-Notch Charpy Impact Testing of Weld Metal and Heat Affected Zone Simultaneously. William P. Hatch, Jr., and Carl E. Hartbower. U. S. Arsenal. *U. S. Office of Technical Services,* PB 126527, Dec. 1955, 14 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Composite test is sensitive to variations in weld metal and heat affected zone toughness and to a seemingly minor variation in welding procedure. The test provides, at least in part, a method for evaluating the relative notch-toughness characteristics of weld metal and heat affected base metal in a natural environment. (Q6, K9r, 7-51)

1327-Q. Factors Responsible for Notch Embrittlement of High-Strength Steels. V. Weiss and E. P. Klier. Syracuse University Research Institute. *U. S. Office of Technical Services,* PB 126571, Dec. 1955, 45 p. (Available at Library of Congress, Washington, D. C.—Microfilm $3.30; Photostats $7.80.)

Hardenability studies for various heat treatments on 4340 steel with a Jominy specimen 2.5 in. diameter and 8 in. long. The two-step and 12-hr. austenitizing treatments were found to yield the best hardenability. Three treatments listed in sequence of increasing merit by notch tensile tests at room temperature on 1.1 and 1.5-in. diameter 4340 steel specimens are: conventional, Lockheed, two-step. Studies of the fracture process were conducted on 4340 steel and two Al alloys for qualitative comparison.
(Q26s, J5; AY, SGB-a)

1328-Q. Damping, Elasticity and Fatigue Properties of Titanium Alloys, High-Temperature Alloys, Stainless Steels and Glass Laminate at Room and Elevated Temperatures. E. R. Podnieks and B. J. Lazan. Minnesota University, Dept of Mechanics and Materials. *U. S. Office of Technical Services,* PB 128211, Mar. 1956, 93 p. (Available at Library of Congress, Washington, D. C.—Microfilm $5.40; Photostats $15.30.)

Resonant fatigue properties in form of curves determined for several characteristic types of parts of the materials named.
(Q7a, Q21, Q8; Ti-b, SS, SGA-h)

1329-Q. Research and Development of Wrought and Cast High-Temperature Alloys. R. R. MacFarlane, R. S. DeFries, E. E. Reynolds and W. W. Dyrkacz. Allegheny Ludlum Steel Corp. *U. S. Office of Technical Services,* PB 129969, Oct. 1954, 98 p. (Available at Library of Congress, Washington, D. C.—Microfilm $5.40; Photostats $15.80.)

Study of Co-base and Fe-base alloys. An alloy containing 10% Ni, 10% Cr, 10% W, 5% Mo and 1% Cb + Ta was outstanding in rupture properties for the wrought Co-base alloys at 1500 to 1700° F. An 18% Mn, 12% Cr, 3% Mo, 0.8% V alloy had a good combination of properties at 1200° F. for the wrought Fe-base alloys. Thermal shock properties were best for the cast alloys containing the highest Co. No correlation was apparent between thermal shock characteristics and other commonly measured properties.
(Q3, Q10a; Co, Fe, SGA-h)

1330-Q. Determination of Tensile, Compressive, Bearing and Shear Properties of Ferrous and Nonferrous Structural Sheet Metals at Elevated Temperatures. John V. Melonas and J. Robert Kattus. Southern Research Institute. *U. S. Office of Technical Services,* PB 131461, Sept. 1957, 308 p. $6.50.

Properties determined at various temperatures after exposure times of ½ to 1000 hr. at the test temperature for AISI 4130 alloy steel, 150,000-psi. nominal strength level; AISI 4130, 180,000-psi. nominal strength level; AISI 4130, 200,000-

psi. strength level; A110-AT Ti alloy; HK 31-H24 Mg alloy; Type-301 stainless steel, full-hard. The Mg alloy was tested over a temperature range from 75 to 600° F., whereas the other metals were tested at temperatures up to 1000° F.
(Q27, Q28, Q2, Q9, 2-62; AY, Ti, Mg, SS)

1331-Q. Effects of Inelastic Action on the Resistance to Various Types of Loads of Ductile Members Made From Various Classes of Metals. Pt. 7. Inelastic Behavior of Aluminum Alloy I-Beams With Elliptic-Type Web Section Cutouts. Will J. Worley and Fred D. Breuer. Illinois Engineering Experiment Station. *U. S. Office of Technical Services,* PB 131556, Dec. 1957, 31 p. $1.

(Q24; Al-b)

1332-Q. Effect of Various Machining Processes on the Reversed-Bending Fatigue Strength of A-110 AT Titanium Alloy Sheet. Robert J. Rooney. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131606, Nov. 1957, 14 p. $.50.

Results of reversed cantilever bending fatigue tests on A-110 AT (5% Al, 2.5% Sn) sheet, machined by various processes: ultrasonic, slab milling, chem-milling. Effect of shot-peening on the fatigue strength of the "as-rolled" alloy.
(Q7a, G17, G24; Ti-b)

1333-Q. Thermal Properties of High-Temperature Materials. I. B. Fieldhouse, J. C. Hedge, J. I. Lang and T. E. Waterman. Armour Research Foundation. *U. S. Office of Technical Services,* PB 131718, Feb. 1958, 88 p. $2.25.

Materials investigated were Hastelloy B, Hastelloy C, Satellite 21, stainless steels 17-7PH, and Type 446, silicon carbide, 60-15 Cr (AST M B 83-46), and Be. The thermal conductivity, specific heat and linear coefficient of thermal expansion were from 1000 to 3000° F., or the melting point of the material, whichever was lower. Experimental measurements and results of conversion of these measurements to the desired physical properties.
(Q-general, 2-62; SGA-h, Ni, SS, Be)

1334-Q. Fatigue Strength Reduction Factors for Inclusions in High-Strength Steels. H. N. Cummings, F. B. Stulen and W. C. Schulte. Curtiss-Wright Corp. *U. S. Office of Technical Services,* PB 131816, Apr. 1958, 39 p. $1.

Tentative values of fatigue strength reduction factors for nonmetallic, nonmalleable inclusions in single-nucleus fractures of rotating beam specimens are determined by two methods. Data for the computations are taken from tests on 309 specimens of SAE 4340 and 4350 steel, of 140,000, 190,000, 230,000, 260,000 and 300,000 psi. ultimate strength. Values of the factors depend upon size of the inclusions and upon hardness level of the steel. For very small inclusions (less than 0.00025 in.) other inhomogeneities inherent in the steel itself dominate the failure of a specimen.
(Q7a, 9-69; AY, SGB-a)

1335-Q.* Creep Under Changing Complex Stress Systems. A. E. Johnson, J. Henderson and V. Mathur. *Engineer,* v. 206, Aug. 22, 1958, p. 287-291.

Creep rate-complex stress-time relations in a 0.2% C steel at 450° C., on Al alloy RR59 at 150 and 250° C., and in a Mg alloy (2% Al) at 20 and 50° C. Experimental data compared with mechanical theories of creep.
(Q3, 3-66; CN, Al, Mg)

1336-Q.* Effect of Induction Hardening on Fatigue Strength. Hiroshi Nakamura, Tatsuo Amakasu and Shiro Ueda. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 475-479.

Influence of induction hardening on the fatigue limit of circular specimens of induction hardened, plain carbon steel containing 0.41% C. Adequate heating time gives maximum fatigue limit; proportional relations exist between fatigue limit and surface hardness; commercial criteria for optimum heating time exist. 8 ref. (Q7a, 2-64, J2g; CN)

1337-Q.* Study of Hydrogen Embrittlement of Iron by Internal-Friction Methods. R. E. Maringer, E. B. Swetnam, L. L. Marsh and G. K. Manning. *National Advisory Committee for Aeronautics TN 4328,* Sept. 1958, 62 p.

Effects of electrolytic charging on the properties of relatively pure Fe and tempered 4340 steel investigated metallographically and by observing internal friction behavior from −196 to 430° C. Electrolytic

charging caused severe structural damage to both Fe and steel, consisting of blisters and internal cracks. In Fe, cracks appeared to initiate grain boundaries and spread in a transgranular fashion. Removal of carbon by a wet-hydrogen anneal resulted in strictly intergranular cracking. Reverse-bend testing was used to demonstrate hydrogen embrittlement of these materials. 38 ref.
(Q26s, Q22; Fe-a, ST)

1338-Q. (English.) **Characteristics of Glide Caused by Stretching a Scratched Aluminum Single Crystal.** Tsien Ling-Chao and Ho Shaw-an. *Scientia Sinica,* v. 6, no. 2, 1957, p. 217-222.

At the start of plastic deformation, an artificial glide occurs earlier than ordinary slippage. Artificial glide can be used to study the effect of thin surface films on the process of gliding in the crystal, on the shear process near the grain boundaries in polycrystals, the influence of surface microscopic cracks on the strength of the crystal. (Q24; Al, 14-61)

1339-Q.* **Strength and Thermal Limitations of Materials for Airframe Components.** J. C. Ekvall. *Society of Automotive Engineers,* Preprint no. S109, 1958, 11 p.

Properties of presently available and advanced development Al, Mg, Ti alloys, low-alloy steel, corrosion resistant steels and Ni, Co and mixed-base alloys. Strength of each group is indicated for typical airframe components at various temperatures. Material-efficiency curves indicate thermal limitations in each case. 18 ref. (Q27a, 2-62, Q10a, T24a; Al, Mg, Ti, AY, SS, Ni, Co)

1340-Q.* (German.) **Influence of Temperature Upon the Elasticity Modulus of the Iron-Chromium Sigma Phase.** Karl Bungardt and Wolfgang Spyra. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 471-477.

Two Fe-Cr alloys with 45 and 41% Cr investigated as to their change in elasticity modulus, electric resistance and heat expansion with changing temperatures. Results are compared with the properties of an Fe-V alloy with 27% V and an Fe-Ni alloy with 74% Ni. The elasticity modulus of the Fe-Cr sigma phase decreases with decreasing temperatures and increases with rising temperatures. 21 ref. (Q21a, 2-61; SS)

1341-Q.* (German.) **Short-Time Fatigue Strength at Elevated Temperatures of Platinum Materials Between Room Temperature and 1250° C.** G. Reinacher. *Metall,* v. 12, July 1958, p. 622-628.

Platinum wires (2 mm. diameter) with 5% In, 5% Rh or 4% Pd were subjected to short-time fatigue tests between 20 and 1250° C. The influence on higher fatigue strength of the alloying components is imperceptible at 1250° C. Alloys with 5% In or Rh in the temperature range between 700 and 900° C. showed a fracture without deformation, while at 500 and 1250° C. ductile fractures with reduction of area were observed. 9 ref.
(Q7a, 2-62; Pt)

1342-Q.* (German.) **Hardening and Deformation of Gold Alloys.** E. Wagner. *Metall,* v. 12, July 1958, p. 628-630.

Investigations on a 14-karat jewelry alloy with 58.5% Au, 20% Ag and 21.5% Cu under the mutual influence of cold deformation and hardening showed properties like Al and Cu alloys. Diagrams for hardness as a function of rolling ratio and annealing time. (Q24, Q29n; Au-b)

1343-Q.* (German.) **Steels With 11 to 20% Chromium—Long-Time Brittleness Tests at 475° C.** Ewald Baerlecken and Heinz Fabritius. *Stahl und Eisen,* v. 78, Oct. 2, 1958, p. 1389-1395.

Literature review on the brittleness tendency of steels with 11 to 20% Cr. (Q26s, 2-62; ST, *Cr*)

1344-Q.* (Russian.) **Investigation of Impact Fatigue.** N. N. Davidenkov and E. I. Belyava. *Metallovedenie i Obrabotka Metallov,* v. 4, Sept. 1958, p. 12-15. (Henry Brutcher, Altadenda, Calif., Translation no. 4349.)

Study of fatigue strength limits under dynamic and static conditions. Study of 10^5 cycles showed that their magnitudes are dependent on the character of thermal treatment and consist of 0.80-0.90 for low temper and 1 for high temper. The less stable the condition of steel the lower are its fatigue limits. The size of the tested specimen has no effect on fatigue strength. (Q7; ST)

1345-Q.* (Russian.) **Some Properties of Iron-Copper Alloys Produced by Infiltration Process.** I. N. Frantsevich and O. K. Teodorovich. *Metallove-*

denie i Obrabotka Metallov, v. 4, Sept. 1958, p. 20-23. (Henry Brutcher, Altadena, Calif., Translation no. 4351.)

Study of metallo-ceramic Fe and Cu-base alloys for machine building. With a 50% Cu content the mechanical properties of Cu-Fe alloys are determined primarily by the Cu-based phase. With a 25% Cu content, the Fe-based phase predominates, with a carcass structure with plasticized fillers. The strength characteristics are typical for those of single-phased Cu-Fe alloys. At high temperatures the Cu phase tends to extend into the Fe grain boundaries and to disintegrate its carcass structure. This process is accompanied by a drop in strength and an increase in plasticity. 10 ref.
(Q-general, M27d, H16e; Fe, Cu)

1346-Q.* (Russian.) **Properties of Surface Zone of Mechanically Worked Steel Containing Various Amounts of Carbide.** I. L. Mirkin and T. A. Sirenko. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 29-33. (Henry Brutcher, Altadena, Calif., Translation no. 4354.)

The surface characteristics of structural steel worked with a mandrel differ considerably from those of original material. The strength of thin surface layer is twice that of original metal. The stress distribution in thin surface layers during metal working depends on the amount of cementite in steel. With the increase of hard and brittle carbide particles there is a decrease in strength and depth of the deformed surface. 6 ref. (Q25, Q24; ST)

1347-Q.* (Russian.) **Influence of Heat Treatment on Anisotropic Properties of Toolsteel Sheet.** E. I. Astrov. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 33-38. (Henry Brutcher, Altadena, Calif., Translation no. 4355.)

Investigation of cold rolled sheet and plate steel specimens. As a result of heating to temperatures above critical point, the anisotropy of plate toolsteel is lowered by three times and the crystallographic anisotropy is lowered two times. After quenching in oil and annealing, as well as after gradual and isothermal quenching, the degree of anisotropy remains the same as that of normalized steel. 5 ref.
(Q24, 2-64; TS, 4-53)

1348-Q.* (Russian.) **Effect of Strain Hardening on Creep Characteristics of Austenitic Steels.** N. D. Sazonova. *Metallovedenie i Obrabotka Metallov*, v. 4, Sept. 1958, p. 46-49. (Henry Brutcher, Altadena, Calif., Translation no. 4358.)

Effect of degree of preliminary deformation at room temperature on creep characteristics. Three types of austenitic steels quenched in oil at 1180 and 1200° were used. Specimens were 200 mm. long, 10 mm. in diameter. By increasing the degree of cold hardening there is less elastic deformation, while the speed of creep formation increases. Preliminary deformation at room temperature increases resistance of metal to creep.
(Q3, 3-68; SS)

1349-Q.* Found . . . a Low-Alloy Steel for Missiles. William M. Stocker, Jr. *American Machinist*, v. 102, Aug. 25, 1958, p. 72, 73.

Produced in the annealed or "soft" condition for comparatively easy forming or cutting (equivalent to 4340), this material, when cooled in air and tempered, develops tensile strength levels in the 280,000-psi. range. Flat-rolled sheet provides a minimum of 5% elongation, transverse and longitudinal, in the full-hard condition. In general, the new steel attains this high strength level as a result of carefully balancing the alloying elements Si, Cr, Mo and V. It contains the minimum composition, including the lowest carbon content for good weldability, with no undissolved carbides. Notch sensitivity is extremely low.
(Q27a, T24e; AY, *Si, Cr, Mo, V*)

1350-Q.* Titanium, Its Properties and Design Potentials. H. E. Barkan. *Electrical Manufacturing*, v. 62, Oct. 1958, p. 100-109, 272, 274, 276, 278.

Current structural and electronic uses for Ti and its alloys. Potential uses based on exceptional properties in design of components and equipment. Properties of standard and new alloys, with fabrication data supported by charts and graphs. (Q-general, G-general, 17-51, 17-57; Ti-b)

1351-Q.* Effect of Heating and Cooling on the Mechanical Properties of an Alloy Steel. A. S. Kenneford and T. Williams. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 30, 1957, p. 823-828.

Alloy steel to specification B.S. En29 investigated. On rapid cooling from a temperature above the critical range the steel possessed poor mechanical properties (low

yield and tensile strengths) at all temperatures down to the commencement of martensite formation at about 300° C., below which there was a sudden increase in yield and tensile strengths accompanied by a marked decrease in ductility. Relation between these mechanical properties and the incidence of cracking after repeated heating and rapid cooling.
(Q27a, Q23p, 2-64; AY)

1352-Q.* Stress-Relaxation Behavior of Chromium-Molybdenum and Chromium - Molybdenum - Vanadium Bolting Materials. J. A. Stafford and M. G. Gemmill. *Institution of Mechanical Engineers, Proceedings,* v. 171, no. 31, 1957, p. 834-842.

Tests on two steels to investigate essential differences between testing under constant load, constant total strain, and a commonly used "weight bar" method that is intermediate between the two. Constant strain results do not entirely support the usual strain-hardening and time-hardening theories. Suggests how relaxation data may be used for design purposes.
(Q23a; AY, *Cr, Mo, V*)

1353-Q.* Study on the Changes of the Properties of Steel Caused by Low-Temperature Quenching. Pt. 4. Improvement of Notch Fatigue Strength. Tadakazu Sakura, Tadashi Kawasaki and Yukizumi Kita. *Japan Society of Mechanical Engineers, Bulletin,* v. 1, no. 2, 1958, p. 114-119.

The effect of low-temperature quenching. Increase in fatigue strength of steel is more notable in notched specimens than in unnotched. 14 ref. (Q7a, J26; ST)

1354-Q.* Microstructural Observation on Fatigue Fracture of Metals. Shigeo Owaku and Seinoshin Morikawa. *Japan Society of Mechanical Engineers, Bulletin,* v. 1, no. 2, 1958, p. 129-133.

Fatigue fracture, initially rough, becomes smooth under repeated stress; the metal dust produced is sintered, and in the case of high-carbon steel quench-hardened, under friction heat, into a very hard material. In this process, if air enters into the crack, the color of fracture surface will turn to black owing to the influence of friction heat; otherwise it would be white.
(Q7, Q26)

1355-Q.* Fatigue of Low Carbon Steel at Elevated Temperature. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka, Tyoichi Koterazawa and Yoshisato Azuma. *Japan Society of Mechanical Engineers, Transactions,* v. 24; July 1958, p. 445-452.

Tests made under the condition of constant deflection with a rotating-type machine at temperatures of 450, 300° C. and at room temperature by applying stress cycles in the range from 170 to 3000 cycles per min. At 450° C., frequency of repeated cycles has the following influence on fatigue life. Under a definite stress amplitude, the number of cycles to fracture is less at lower frequency and time to fracture has a definite value irrespective of frequency. (Q7a, 2-62; CN-g)

1356-Q.* Cumulative Fatigue Damage at Elevated Temperature. William K. Rey. *National Advisory Committee for Aeronautics, TN 4284,* Sept. 1958, 53 p.

Tests on heat treated SAE 4130 alloy steel. S-N curves at room temperature, 400 and 800° F. obtained. Results compared with theoretical analysis. 37 ref.
(Q7f; SS, 2-62)

1357-Q.* Rate of Fatigue-Crack Propagation in Two Aluminum Alloys. Arthur J. McEvily, Jr., and Walter Illg. *National Advisory Committee for Aeronautics, TN 4394,* Sept. 1958, 46 p.

Sheet specimens, 2 in. and 12 in. wide, of 2024-T3 and 7075-T6 Al alloys were tested in repeated tension with constant-amplitude loading. Stresses ranged up to 50,000 psi. based on the initial area. Good agreement between the results and predictions was found. 11 ref.
(Q26q, Q7; Al-b)

1358-Q.* A Phenomenological Theory for the Transient Creep of Metals at Elevated Temperatures. Elbridge Z. Stowell. *National Advisory Committee for Aeronautics, TN 4396,* Sept. 1958, 31 p.

Theory of high-temperature behavior of any metal is based on assumption that the metal exists in two phases, each with its own elasticity and viscosity. Experimental work on Al, gamma-iron, Pb and 7075-T6 Al alloy agrees with theory. 10 ref. (Q3; Fe, Al, Pb)

1359-Q.* Fatigue of Structural Materials at High Temperature. B. J. Lazan. *North Atlantic Treaty Organization, AGARD Rept. 156,* Nov. 1957, 27 p.

Engineering factors important in high-temperature fatigue tabulated.

Effects of various environmental conditions are generalized when justified by prior work. Effects of mean stress, alternating stress, temperature and stress concentration. Nature and general significance of creep phenomena which occur under various combinations of cyclic stress and mean stress. Increasing importance of resonant vibrations as a cause for fatigue. Roles of damping, elasticity and conventional fatigue properties analyzed to provide criteria for judging resonance fatigue strength. Relative importance of these properties illustrated by examples. 28 ref. (Q7, 2-62)

1360-Q.* Chromium Gives Stainless Properties to Iron-Aluminum Alloys. B. King, J. J. Mueller, N. N. Ida and F. G. Tate. *SAE Journal,* v. 66, Oct. 1958, p. 48-52.

Undesirable properties of Fe-Al alloys can be rectified by adding a sizable amount of Cr. This eliminates the superlattice as a source of difficulty. Cr also contributes corrosion resistance. Small quantities of other elements are also added to impart specific characteristics to the alloys. Ti, Si, Ta, Mo and Be are thought to promote high-temperature strength and good creep properties. (Q-general, 2-62, 2-60; Fe, *Al, Cr,* SGA-g)

1361-Q.* Scratch Hardness. Pt. 1. Relation to Cold Working. Tomiya Sutoki and Takeo Hikage. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, p. 85-96.

Scratch hardness was examined on polycrystals and single crystals of several metals. A law similar to Meyer's for indentation hardness held good between the load and scratch width. Change in scratch width with cold working was very small due to the heat evolved during scratching. Scratch hardness, contrary to Tammann's interpretation, is related to the annealed state rather than to the severely hardened state of a metal. 11 ref. (Q29d, 3-68)

1362-Q.* Scratch Hardness. Pt. 2. X-Ray Investigation of Structural Change. Tomiya Sutoki and Koichi Nakajima. *Tohoku University, Science Reports of the Research Institutes,* v. 10, Aug. 1958, p. 269-275.

Structural change due to scratching or indenting Al and Ag studied by X-ray analysis. Scratch hardness appears to be related to the annealed state. (Q29d; Al, Ag)

1363-Q.* On Young's Modulus and Grain Size in Nickel-Copper Alloys. Yuki Shirakawa and Ken'ichi Numakura. *Tohoku University, Science Reports of the Research Institutes,* v. 10A, no. 2, 1958, p. 110-119.

Young's modulus and grain size were measured on ten types of polycrystalline ferromagnetic Ni-Cu alloys annealed at 700, 800, 900, 1000 and 1100° C. An empirical relation was found between Young's modulus E and the average area of crystal grains S. Young's modulus versus composition curves for alloys with the same grain size were not always similar to one another, but every curve showed a minimum. (Q21a, M27c; Ni, Cu)

1364-Q.* Modes of Deformation Leading to Fracture of Metals: A Review of Progress to January 1958. R. Doldon and R. F. Lumb. *United Kingdom Atomic Energy Authority, IGRO-TN/C-919,* 1958, 7 p.

Certain crystals of polycrystalline super-purity Al specimens deformed in tension exhibit a banded slip surface. The stress axis of these crystals is <123>. Suitability of microradiography for investigating the effect of strain rate and temperature on the formation and initial propagation of cavities instigated by deformation. 14 ref. (Q26, Q24; Al-a)

1365-Q. Iron-Aluminum-Base Alloys for Reactor Components. William A. Maxwell. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/707, 1958, 18 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Properties of experimental alloy containing 7.5% Al, 5% Cr, 1% Cb, ½% Ti and 86% Fe. Tensile tests indicate ample ductility for carrying out manufacturing operations incidental to fuel element fabrication. 9 ref. (Q27a, T11g, 17-57; Fe, Al)

1366-Q. Tensile Properties of Pure Plutonium and Some Aluminum-Plutonium Alloys. H. R. Gardner, C. H. Bloomster and J. M. Jefferes. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1081, 1958, 9 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Objective was to determine mechanical and physical properties of cast fuel rods suitable for fuel elements. Ultimate strength, yield strength, modulus of elasticity, modulus of resilience, diamond pyramid hardness and density. Stress-strain relationships. (Q27a, T11g; Pu, Al-b)

1367-Q. Performance of Metals During Six Years Service in the Materials Testing Reactor. M. H. Bartz. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1878, 1958, 23 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

AISI Type 347 stainless steel, Al alloy 1100, Al alloy 356 and QMV Be as reactor core materials. Performance of fuel elements and control rods considered. (Q-general, 2-67; W11p, 17-57; SS, Al-b, Be)

1368-Q. Effects of Irradiation on the Structural Materials in Nuclear Power Reactors. J. C. Wilson. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1978, 1958, 26 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Tensile and notch-impact properties of a number of steels tabulated as a function of neutron dose and irradiation temperature. Sensitivity to dose and irradiation temperatures varies in different steels whose nominal properties are similar in the absence of irradiation. 26 ref. (Q27a, Q6n, 2-67, W11p, 17-57; ST)

1369-Q.* (French.) **Note on the Modulus of Elasticity of Some Light Alloys.** Claude Mascre and Andre Lefebvre. *Fonderie,* no. 150, July 1958, p. 302-304.

LeRolland-Sorin elasticimeter was used to measure modulus of elasticity of Al-Cu, Al-Mg and Al-Si alloys. Al-Mg and Al-Cu specimens, regardless of analysis, had almost same modulus, but in Al-Si alloys this measurement increased with increase in Si content. Heat treating was found to have no appreciable influence on modulus of any of alloys studied, but modulus of chill-cast specimens was slightly higher than that of sand-cast. Study also confirmed indirectly absence of relationship between modulus of elasticity and other mechanical properties. (Q21a, 2-60, 2-64; Al-b)

1370-Q.* (German.) **"Contraction Work" in Rupture as a Characteristic of Materials.** L. Gillemot and G. Sinay. *Acta Technica,* v. 22, no. 1-2, 1958, p. 149-173.

Formula derived for the contraction work (i.e., work of volume unity at the reduced section in rupture). Contraction work of steel A60.11 computed as 41.0 mkg. per cc.; determined empirically as 47.3-51.0 mkg. per cc. Contraction work tests of CrV 135 steels, Sn-Zn alloys, Al-Si, Al-Fe, Al-Zn and Cu-Ni alloys. 6 ref. (Q26; SS-b, Sn-b, Al-b, Cu-b, Zn-b, Ni-b)

1371-Q.* (German.) **New Heat Resistant Pearlite-Ferrite Steels.** Karlheinz Werner. *Bergakademie,* v. 10, May-June 1958, p. 310-315.

Experiments on strength of heat resistant Cr, Mo and Cr-Mo steels, as influenced by service temperature. In testing for service temperatures up to 350° C., it is sufficient to determine the elastic limit or the 0.2% elongation; for the range 400 to 475° C., creep limit is found; for more than 500° C., the long-time strength and long-time elastic limit should be determined. 12 ref. (Q-general, 2-61; SS, *Cr, Mo*)

1372-Q.* (German.) **Toughness of High-Speed Steels.** H. D. Weckener. *Industrieblatt,* v. 58, Sept. 1958, p. HT69-HT73.

Determination of toughness by measuring the ultimate deformation before fracture of the high speed steel class DMo5 (0.81% C, 4.11% Cr, 6.65% W, 2.01% V, 4.61% Mo). Toughness curve declines sharply. (Concluded.) 14 ref. (Q23r; TS-m)

1373-Q.* (German.) **Comparison Between Vickers and Knoop Hardness Testing Methods.** R. Chatterjee-Fischer and O. Schaaber. *Industrieblatt,* v. 58, Oct. 1958, p. HT80-HT82.

Advantages of rhombus-shaped Knoop-diamond: Small impression affects smaller zone in cross direction than square impression by Vickers diamond; important for hardness tests above cross-section of very thin layers. Determination of hardness requires only measurement of long diagonal; shifting of measuring head, with resulting loss of time, is superfluous. Sources of errors in reading measurements of diagonals are reduced since long diagonal in Knoop diamond is 2.8 times the size of Vickers' diagonal. (Q29c)

1374-Q.* (German.) **Importance of Tantalum Carbide in Hard Metal Production.** Miroslav Petrdlik and Vladimir Dufek. *Neue Hütte,* v. 3, Aug. 1958, p. 483-489.

Cutting capacity, flexural breaking strength, hardness, specific gravity, resistivity, resistance to oxidation and influence of type of TaC addition in base mixtures. 12 ref.
(Q-general, P-general, SGB-g, Ta, C)

1375-Q.* (German.) **Mutual Reaction Between Hardness and Modulus of Elasticity of Pure Metals at High Temperatures.** M. G. Losinski and S. G. Fedotow. *Neue Hütte,* v. 3, Aug. 1958, p. 489-494.

High-temperature properties of platinum, palladium, rhodium, iridium, tungsten, molybdenum, titanium, zirconium, iron, nickel, cobalt, copper and silver. 10 ref. (Q21a, Q29n; Pt, Pd, Rh, Ir, W, Mo, Ti, Zr, Fe, Ni, Co, Cu, Ag)

1376-Q.* (German.) **Fatigue Tests of Brazed Pipe Connections.** J. Colbus. *Schweissen und Schneiden,* v. 10, Aug. 1958, p. 312-316.

Fatigue tests of brazed joints on bicycle frames. Tubes were of cold drawn steel, 35 mm. with 1.5-mm. wall and 23.5-mm. with 1.1-mm. wall. Test apparatus consisted of high-frequency pulsator, optical dynameter and photo-electric amplitude regulator. Variation in strength of joints in different locations explained by variation in stress. Ag-brazed joints proved superior to Cu-brazed. 4 ref.
(Q7; ST, 7-52)

1377-Q.* (German.) **Influence of Temperature and Speed of Deformation on the Deformation Resistance of Some Steels.** V. Valorinta. *Werkstattstechnik und Maschinenbau,* v. 48, Aug. 1958, p. 452-456.

Deformation resistance decreases with increased deformation temperature and increases with the deformation speed. In the first case, a transitory sudden increase of deformation resistance was observed within the temperature range of recrystallization, the more accentuated the lower the deformation speed. 4 ref. (Q24, 2-61, 3-67; ST)

1378-Q.* (Italian.) **Size and Notch Effects in Fatigue Problems.** Antonio Erra. *Ingegneria Meccanica,* v. 7, June 1958, p. 41-46.

Size and notch effects in fatigue tests on both smooth and notched specimens described in light of published experimental results. Notch sensitivity of steels defined; factors which influence it. 12 ref.
(Q23s, Q7; ST)

1379-Q.* (Italian.) **Fatigue Tests Under Increasing Load on a Steel With Different Types of Surface Finish.** Ugo Rossetti. *Ingegneria Meccanica,* v. 7, June 1958, p. 47-56.

Rotary bending fatigue tests under increasing load in specimens of UNI 38 NCD 4 steel with five degrees of surface finish, roughness of which was measured in the longitudinal plane. Prot and Locati methods, as well as method of direct calculation for establishment of fatigue limits; results compared. Data obtained by tests analyzed statistically. Relationship between roughness and fatigue limit. 13 ref.
(Q7, S14; ST)

1380-Q.* (Italian.) **Comparison Between Degrees of Roughness of Metal Surfaces Finished by Different Methods and the Fatigue Limit of the Material.** Giovanni Perotti. *Ingegneria Meccanica,* v. 7, June 1958, p. 57-60.

Surfaces of specimens of UNI 38 NCD 4 steel were finished by hand polishing with emery cloth, finish turning on an engine lathe, grinding and shot-peening. Surface roughness was measured; all specimens were subjected to rotary bending fatigue tests. Two conclusions were: (1) in specimens of equal size and shape, the one having lesser surface roughness has greater fatigue resistance; (2) type of finish machining performed (i.e., whether chip removal is involved or not) and direction of marks left by finishing operation also influence fatigue limit. 9 ref. (Q7a, S14)

1381-Q.* (Italian.) **Fatigue Limit of Light Alloys.** Lamberto Mori. *Ingegneria Meccanica,* v. 7, June 1958, p. 63-72.

Review of dynamic characteristics of principal Al alloys suitable for plastic working. Specimen shape, size, surface finish and fatigue testing equipment used in rotary bending tests. Effect of notching on fatigue resistance and on degree of scatter of results and shape of fatigue curve. 10 ref. (Q7a; EG-a38)

1382-Q.* (Japanese.) **Studies on Sintered Aluminum Compacts.** G. Ito and F. Sawayanagi. *Scientific Research Institute, Reports, Komagome, Bunk-*

yo-Ku, Tokyo, Japan, v. 34, no. 4, 1958, p. 266-275.

Specific gravity, hardness, tensile strength, elongation, formability, microscopic tests and growing of crystals of sintered Al powder. Samples are made by Irmann's method. The finer the grain, the greater the hardness; best Vickers hardness is 72, tensile strength 24 kg. per sq. mm. If Cu (4%) and Mg (1%) are added, hardness is 122, tensile strength is 35 kg. per sq. mm. and elongation is 1%. (Q-general, Al, *Cu, Mg,* 6-72)

1383-Q.* High-Temperature Metallurgy Today. L. P. Jahnke and R. G. Frank. *Metal Progress,* v. 79, Nov. 1958, p. 77-82.

Surveys most promising areas for high-temperature development and gives the best alloys among the light metals and steels. (Q24, Q-general, 2-62, 17-51; SGA-h)

1384-Q.* (English.) Brittle Fracture. The Problem as it Exists Today. G. M. Boyd. *Metalen,* v. 13, June 15, 1958, p. 200-205.

Brittle fracture in welded steel structures. Appearances and characteristics of brittle fracture. Work and energy relation in the initiation of propagation of brittle fracture. (To be continued.) 10 ref. (Q26s; ST, 7-51)

1385-Q.* (English.) Brittle Fracture. The Problem as it Exists Today. Pt. 2. G. M. Boyd. *Metalen,* v. 13, June 30, 1958, p. 224-228.

Six prominent tests commonly used in assessing the transition range and fracture characteristics. Charpy, Tipper and Robertson test curves for mild steels showing variations in fracture behavior as indicated crystallinity and energy absorption. Effect of welding on brittle fracture. 4 ref. (Q26s; ST, 7-51)

1386-Q.* (German.) Creep Behavior of Aluminum at Temperatures up to 300° C. K. Wellinger, E. Keil and G. Maier. *Aluminium,* v. 34, Aug. 1958, p. 458-463.

Creep tests were made on alloys Al 99.5 F7, AlMgSi 1 F32 and GK-Al-Si 10 Mg at temperatures up to 300° C. and times up to 10,000 hr. Extrapolation of the probable times to rupture for those loads which produce 1% permanent set in 10,000 hr. indicated that the time to failure for the same elongation varied widely with the alloy composition, heat treatment and temperature. Possibility of rapid test method. (Q3m, 2-60, 2-61, 2-64; Al-b, *Mg, Si*)

1387-Q. High Temperature Metals. *Metal Industry,* v. 93, Oct. 10, 1958, p. 309-310.

Mechanical and physical properties, refractory metals and high-temperature techniques presented at a symposium on metals and alloys above 1200° C. at Oxford University. (Q-general, P-general; 2-62, SGA-h)

1388-Q.* (Japanese.) Studies on Casting Stress. Pt. 2. Kenji Chijiiwa. *Japan Foundrymen's Society, Journal,* v. 30, July 1958, p. 531-535.

Casting stresses of ordinary inoculated and spheroidal cast irons compared using ring-shaped specimens with an arm across the diameter. Casting stresses were lowest for ordinary and highest for spheroidal cast irons. Castings with a boss in the center of the arm were used to investigate relation between ring and the castings stressed. The stresses became almost negligible when volume surface areas ratios of the ring and boss were equal. (Q25, E25; CI, CI-r)

1389-Q. (Polish.) Investigations on Creep Phenomena Based on Tensile Tests. Jerzy Wantuchowski. *Archiwum Hutnictwa,* v. 3, no. 3, 1958, p. 201-226.

Creep tests under a constant load with a special apparatus. Relationship between true tension, ideal work hardening and velocity of deformation. (Q3)

1390-Q.* (Russian.) Influence of Thermo-Mechanical Treatment in Ladle on Impact Toughness of Structural Alloy Steel. E. N. Sokolkov, L. V. Smirnov and S. N. Petrova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 276-280.

Study of industrial steel type 37XHZA and 35XGCA in shape of cross bar 20 × 20 × 200 mm. Heating to 1150° in ladle followed by 4-hr. annealing at 550° gives impact toughness of 10.7 and hardness of 30; heating to 1150° in ladle, quenching, annealing at 550° for 4 hr., gives impact toughness of 4.7 and hardness of 25. 4 ref. (Q6, Q29, D9m, 2-64; AY)

1391-Q.* (Russian.) Influence of Cold Hardening and Aging on Resistance to Rupture and Plasticity of Steel at

—196° C. E. M. Shevandin and R. E. Reshetnikova. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 293-303.

Investigation on polished as well as cut specimens of low-alloy steel 30 mm. thick in hot rolled condition. On none of the tested polished specimens was there any brittle fracture. By cold hardening, beginning with 10% and higher, resistance to rupture continuously rises. Subsequent aging of polished specimens lowers their resistance to rupture. Mechanical aging of cut specimens at 250° also lowers their resistance to rupture. This is accompanied by a lessening of contraction in both specimens. 16 ref. (Q23, Q26s, 2-64, 3-68; AY)

1392-Q.* (Russian.) **Characteristics of Gradual-Monotonic Process of Plastic Deformation of Steel I.** L. G. Afendin. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 304-310.

Two-stage process of plastic deformation of structural steel at room temperature. The transition from one to another stage of plastic deformation does not alter the direction of the main axis of deformation. However, during monotonic transition the axial directions changed. In these changes there was observed an anisotropy in the mechanical properties. 6 ref. (Q24, 3-72; ST)

1393-Q.* (Russian.) **Influence of Heating Temperature on Mechanical Properties of Cast Iron With Spheroidal Graphite.** S. G. Guterman and G. A. Pisarenko. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 311-314.

Effect of heating temperature on high-strength iron with redistributed phosphorus. Iron melted in induction furnace of 200-kg. capacity, and treated in ladle with 0.5% Mg. Increasing heating temperature to 950° leads to remarkable growth in plastic properties of iron and an even greater increase in its impact toughness. Increase above 950° does not result in any further changes. 6 ref. (Q-general, E25q, 2-60; CI, *P, Mg*)

1394-Q.* (Russian.) **Influence of Preliminary Cold Deformation on Creep.** G. I. Nosova and V. M. Rosenberg. *Fizika Metallov i Metallovedenie,* v. 6, no. 2, 1958, p. 321-325.

Experiments conducted on alloys of Fe-Ni-Cr-Co with varying amounts of Co. Creep was tested by deformation bending. By simultaneous action of temperature and pressure, the strengthening of preliminarily deformed objects takes place much more rapidly then if only subjected to temperature increase. 6 ref. (Q3, Q5, 2-61, 3-68, 3-74; Co, Cr, Fe Ni)

1395-Q. Diesel Engine Cylinder Bore Wear. Pt. 3. R. T. Rolfe. *Allen Engineering Review,* no. 39, Oct. 1958, p. 24-33.

Behavior of gray cast Fe with 2.5 to 4.5% C. (Q9, W11j; CI-n)

1396-Q. Brittle Failure of 5% Aluminum Bronze. A. C. Hamstead. *Industrial and Engineering Chemistry,* v. 50, Oct. 6, 1958, p. 87A-88A.

(Q26s; Cu-s, *Al*)

1397-Q. Mechanism of Wear in Repeated Friction. Toshio Sata. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 407-414.

(Q9)

1398-Q. (Japanese.) **Secondary Stage Creep of Mild Steel.** Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Masateru Anami. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 424-433.

Calculations are made for 0.14% C steel. 25 ref. (Q3; CN)

1399-Q. Simple Determination of Creep Limit for Mild Steel. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Masateru Onami. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 434-440.

14 ref. (Q3; CN)

1400-Q. Effect of Stress Reduction on Secondary Creep of Mild Steel. Toshio Nishihara, Shuji Taira, Kichinosuke Tanaka and Kiyotsugu Ohji. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 441-445.

5 ref. (Q3, 3-66; CN)

1401-Q. Theory of Plastic Deformation of Metals at High Temperatures. Toshio Nishihara, Shuji Taira, Kichinosuke Tanka and Kiyotsugu Ohji. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 452-458.

(Q24, Q-62)

1402-Q. Deformation of Gray Cast Irons Under Combined Stresses. Masuji Uemura and Megumi Sunagawa. *Japan Society of Mechanical Engi-*

neers, Transactions, v. 24, July 1958, p. 459-465.

Fracture tests on thin-walled tubes of gray cast irons under various ratios of combined tension and torsion. 8 ref. (Q26; CI-r)

1403-Q. Fracture of Metals. Pt. 3. Fracture of Gray Cast Iron Under Combined Stress. Masuji Uemura. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 466-471.

14 ref. (Q26; CI-n)

1404-Q. Tungsten Carbide and Steel Ball Indenters. Takeo Yoshizawa. *Japan Society of Mechanical Engineers, Transactions,* v. 24, July 1958, p. 503-510.

Use of tungsten carbide balls as indenters in Brinell and Rockwell hardness testing. 7 ref. (Q29)

1405-Q. Techniques for Surface Examination and Their Contribution to Our Knowledge of Friction and Wear. F. T. Barwell. *Lubrication Engineering,* v. 14, Sept. 1958, p. 391-397.

(Q9)

1406-Q. Aluminum Sand Castings. W. J. Reichenecker and D. K. Fox. *Materials in Design Engineering,* v. 48, Oct. 1958, p. 103-105.

Repeated impact and fatigue at high temperatures are analyzed for C4A, SC51A, ZG61A, SG70A and G10A alloys. Fatigue strength of these alloys is noticeably lower at 480° F. than at room temperature or 300° F. (Q6, Qy; Al, 5-60)

1407-Q. Friction and Wear With Reactive Gases at Temperatures up to 1200° F. Gordon P. Allen, Donald H. Buckley and Robert L. Johnson. *National Advisory Committee for Aeronautics* TN 4316, Sept. 1958, 26 p.

Boundary lubrication of metal surfaces with gases containing chlorine or sulphur studied from 75 up to 1200° F. 19 ref. (Q9)

1408-Q. X-Ray Diffraction of Ductile to Brittle Fracture. Masaki Watanabe, Kazuyoshi Kamachi and Yoshihiko Mukai. *Osaka University, Technology Reports,* v. 8, Mar. 1958, p. 113-124.

(Q26, M22g)

1409-Q. Variations in the Bending Strength of Steel Wire. Masayoshi Tagaya and Yoshiro Soyama. *Osaka University, Technology Reports,* v. 8, Mar. 1958, p. 125-129.

Variations of quenched wire (0.5 mm. diameter with 0.80% Mn and 0.64% C.) observed in relation to quenching and testing conditions. 7 ref. (Q5g; 4-61, ST)

1410-Q. Extra Fatigue Strength Is Now Available. W. S. Hyler. *SAE Journal,* v. 66, Oct. 1958, p. 40-41.

Substantial increases in fatigue strength result from mechanical polishing of steels.
(Q7a; L10b; ST)

1411-Q. How to Get More From High Strength Steel. *Steel,* v. 143, Nov. 17, 1958, p. 128-129.

Substandard performance can be traced to rolling or forging, machining, heat treatment and finishes. (Q7, J-general, F-22, G17, SS, SGB-a)

1412-Q. Internal Friction: a New Physical Quantity for the Study of Metals. T. Federighi. *Alluminio,* v. 25, no. 5, May 1956, p. 225-230. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1330.)

Previously abstracted from original. See item 642-Q, 1956. (Q22)

1413-Q. Erosion Wear of Metals and Protection by Coatings. A. V. Schreider. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 181-188. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB108.)

(Q9, 8)

1414-Q. Reagents for Evaluation of Susceptibility to Temper Brittleness in Steel. F. M. Del Corral and J. M. B. Castroy Mosquera. *Instituto del Hierro y Acero,* v. 9, Apr. 1956, p. 478-480. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(Q26s; ST)

1415-Q. Methods for Calculation of Primary Creep With Application to the Investigation of the Creep of Rotors. Y. N. Rabotnov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 5, 1957, p. 30-41. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-44K20R.)

(Q3n, T7h)

1416-Q. Study of Structural Changes in Nickel-Chromium Alloy During Creep. G. Ya. Kozyrskii. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 8, Aug.

1958, p. 90-92. (Henry Brutcher, Altadena, Calif., Translation no. 4402.)

X-ray study and micrographic analysis of an 80.2% Ni, 19.8% Cr alloy for changes in structure during creep. Data on total strain, creep rates during the different stages of creep and hardness as function of initial structure. (Q3; Ni, *Cr*)

1417-Q. Effect of Columbium and Titanium on Properties of Stainless Steels. A. M. Samarin and A. A. Yaksevich. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 10, 1955, p. 107-116. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(Q-general, 2-60; SS, *Cb, Ti*)

1418-Q. Effect of Cold Reduction on Irreversible and Reversible Temper Brittleness. M. M. Shteinberg. *Metallovedenie i Obrabotka Metallov*, v. 2, no. 6, 1956, p. 26-35. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 869-Q, 1956. (Q26s, 3-68; CN)

1419-Q. Laboratory Methods of Estimating Liability of Steel to Brittle Fracture. Y. M. Potak. *Zavodskaya Laboratoriya*, v. 22, no. 2, 1956, p. 208-217. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 356-Q, 1956. (Q26s; ST)

1420-Q. Estimation of Ductility, Creep at Rupture and of Creep-Resisting Steels and Alloys at High Temperatures. A. V. Stanyukovich. *Zavodskaya Laboratoriya*, v. 23, no. 4, 1957, p. 476-484. (Henry Brutcher, Altadena, Calif., Translation no. 4232.)

Criterion adopted to index the ductility of various steels and alloys in long-time service at elevated temperatures. Effects of temperature and aging on creep behavior. (Q23p, Q3, 2-62; ST, AY)

1421-Q. (German.) Compression Strength and Corrosion Resistance of Cast Iron Containing Lamellar Graphite (Gray Iron). A. Gabriel. *Industrie-Anzeiger*, v. 80, Sept. 12, 1958, p. 23-25.

6 ref. (Q28g, R-general; CI-n)

1422-Q. (Japanese.) Wear. M. Nakayama. *Metals*, v. 28, Oct. 1958, p. 731-735.

(Q9)

1423-Q. (Book.) References on Fatigue. 64 p. 1958. American Society for Testing Materials, STP no. 9-I, 1916 Race St., Philadelphia 3, Pa. $3.

Articles published in 1957 on fatigue of structures and materials; brief abstracts included. (Q7, 11-65)

1424-Q. Effect of Lubricant on Penetration of a Diamond-Point Indenter Into Ductile Metals. V. D. Kuznetsov and A. I. Loskutov. *Fizika Metallov i Metallovedenie*, v. 2, no. 3, 1956, p. 509-513. (Henry Brutcher, Altadena, Calif., Translation no. 4406.)

(Q29c; NM-h)

1425-Q. Effect of Preloading on the Yield Point of Iron. M. M. Hutchinson and N. Louat. *Acta Metallurgica*, v. 6, Jan. 1958, p. 8-12.

Measurement of increase in yield stress in Fe caused by preloading below the yield point. 7 ref. (Q23b, 3-70; Fe)

1426-Q. Polyslip in Polycrystals. U. F. Kocks. *Acta Metallurgica*, v. 6, Feb. 1958, p. 85-94.

Simultaneous glide of dislocations in many slip systems of each grain (polyslip) may cause plastic deformation of cubic polycrystals. Theory checked with high-purity Al samples. 30 ref. (Q24a, M26b; Al-a)

1427-Q. Elastic Properties of Metals and the Resonating Valence Bond Theory. G. Bergman. *Acta Metallurgica*, v. 6, Feb. 1958, p. 110-115.

Elastic properties of metals with cubic close-packed and hexagonal close-packed structures derived on the basis of a modification of Pauling's theory. 7 ref. (Q21, M25)

1428-Q. Influence of Microstructure on the Carbon Damping Peak in Iron-Carbon Alloys. Philip Stark, B. L. Averbach and Morris Cohen. *Acta Metallurgica*, v. 6, Mar. 1958, p. 149-155.

Internal friction peak due to stress-induced migration of carbon in b.c.c. iron is influenced by grain size and intercarbide distance. 12 ref. (Q22; Fe, C, 2-69)

1429-Q. Deformation Twinning in Silver-Gold Alloys. H. Suzuki and C. S. Barrett. *Acta Metallurgica*, v. 6, Mar. 1958, p. 156-165.

Deformation twinning of single crystals at low temperatures. Upper temperature range for twinning decreases with increasing Au content. 7 ref. (Q24b, Ag-b, *Au*, 2-61)

1430-Q. A Theory of the Origin of Fatigue Cracks. N. F. Mott. *Acta Metallurgica*, v. 6, Mar. 1958, p. 195-197.

Model given to explain how a slip band can develop into a crack if dislocations in the band are free to move backward and forward. 18 ref. (Q7, Q26r)

1431-Q. Plastic Behavior of Copper Crystals Containing Zinc in the Surface Layer. M. A. Adams. *Acta Metallurgica*, v. 6, May 1958, p. 327-338.

Critical shear stress measurements showed that a lightly zincified surface strengthens a Cu crystal more effectively than a heavily zincified surface; removal of the surface layer from a lightly zincified crystal caused a large decrease in strength and disappearance of the yield point. 11 ref. (Q23, 3-69; Cu, *Zn*)

1432-Q. Investigation of the Rate Controlling Mechanism for Plastic Flow of Copper Crystals at 90 and 170°K. H. Conrad. *Acta Metallurgica*, v. 6, May 1958, p. 339-350.

Investigation to determine whether the intersection of dislocations is the rate controlling process in low-temperature deformation. 32 p. (Q24; Cu)

1433-Q. Adiabatic Young's Modulus and Internal Friction of Superconducting Lead and Tin. B. Welber and S. L. Quimby. *Acta Metallurgica*, v. 6, May 1958, p. 351-359.

Thermodynamics of the superconducting transition. 31 ref. (Q21a, Q22, P15g; Pb, Sn)

1434-Q. Creep of Aluminum Under Extremely Small Stresses. J. G. Harper, L. A. Shepard and J. E. Dorn. *Acta Metallurgica*, v. 6, July 1958, p. 509-518.

High-temperature creep of Al controlled by two different mechanisms —grain-boundary shearing at higher stress, motion of dislocations at lower stress. 15 ref. (Q3n; Al, 2-62, 3-66)

1435-Q. Mechanical Behavior of Microcrystals. W. W. Webb. and W. D. Forging. *Acta Metallurgica*, v. 6, July 1958, p. 462-469.

Bend tests on small crystals and whiskers of beta-manganese, Mn_5Si_3, alpha-Si_3N_4, alpha-Al_2O_3, Cr_3O_4, Cr_2N, Cr and Fe_3C. All showed high elasticity and strength near theoretical values. 27 ref. (Q-general; Si, *Mn*, Al, Fe, Cr, O, C, N, 14-61)

1436-Q. Temperature Dependence of the Flow Stress on an Age-Hardened Alloy. A. Kelly and C. Chiou. *Acta Metallurgica*, v. 6, Sept. 1958, p. 565-571.

Critical resolved shear stress of single crystals of an Al-Cu alloy between 77 and 373° K. Reversible change of flow stress varies with temperature in a manner similar to that shown by pure Al crystals in that, after elimination of the elastic constants with temperature, it is approximately constant at temperatures above 160° K. but increases at lower temperatures. 27 ref. (Q24; Al-b, Cu, 14-61, 2-61)

1437-Q. Influence of Elastic Strains on the Recovery of Cold Worked Copper. *Acta Metallurgica*, v. 6, Oct. 1958, p. 613-619.

12 ref. (Q22n; Cu, 3-68)

1438-Q. Solute Hardening of Close-Packed Solid Solutions. P. A. Flinn. *Acta Metallurgica*, v. 6, Oct. 1958, p. 631-635.

Effect of local order, segregation of solute atoms on strength of Ag-Au, Cu-Au, Cu-Zn alloys. 21 ref. (Q27a, M26; Ag, Au, Cu, Zn, 9-69, 14-67)

1439-Q. Deformation and Fracture of Alpha-Iron at Low Temperatures. W. D. Biggs and P. L. Pratt. *Acta Metallurgica*, v. 6, Nov. 1958, p. 694-703.

Stress for slip, twinning and cleavage of single crystals at −183° C. Yield point at −183° C. influenced by prior twinning at room temperature. 34 ref. (Q24, Q23b, Q26n; Fe, 14-61, 1-63)

1440-Q. Influence of Grain Size on the Stored Energy and Mechanical Properties of Copper. L. M. Clarebrough, M. E. Hargreaves and M. H. Loretto. *Acta Metallurgica*, v. 6, Dec. 1958, p. 725-735.

At low strains, flow stress is higher, stored energy greater for fine-grained Cu. At higher strains, both grain sizes exhibit same values. 25 ref. (Q-general, 2-59; Cu)

1441-Q. Compound Semiconductors. H. P. R. Frederikse. *Journal of Metals*, v. 10, May 1958, p. 346-350.

Survey of mechanical, electrical, optical, magnetic and thermal properties. 21 ref. (Q-general, P-general; EG-j, 14-68)

1442-Q. Ductile Ceramics—a High-Temperature Possibility. Earl R. Parker, J. A. Pask, J. Washburn, A. E. Gorum and W. Luhman. *Journal of Metals,* v. 10, May 1958, p. 351-353.

Cubic ceramic crystals (for example, NaCl, CsBr, AgCl, KCl, MgO) possess substantial amounts of ductility. Purity and environment affect brittleness. 18 ref.

(Q23p, 2-66, 3-69; Ag, Cs, Na, K, Mg, NM-f, SGA-h)

1443-Q. Whiskers—Their Strength. George A. Hoffman. *Journal of Metals,* v. 10, Sept. 1958, p. 591-595.

Tiny, perfect, crystal filaments, with strength approaching the theoretical limit of atomic cohesion, may be the building-blocks of the astronauts. 7 ref. (Q27; 14-61)

1444-Q. High-Purity Cobalt. Its Properties. F. R. Morral. *Journal of Metals,* v. 10, Oct. 1958, p. 662-664.

Hardness data and microstructure of zone-refined Co. 9 ref.

(Q-general, M27; Co)

1445-Q. Fracture of Zinc Crystals in Bending. John J. Gilman. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 293-294.

Glide plane of an edge dislocation is a weak region. 4 ref.

(Q26, Q5; Zn)

1446-Q. Microcrack Formation in Hydrogen Embrittled Zirconium. A. P. Young and C. M. Schwartz. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 309-310.

Strain rate effect in neighborhood of hydride precipitate in tensile impact samples. (Q26p, 3-68; Zr-b, *H*)

1447-Q. Elevated Temperature Characteristics of Internally Oxidized Titanium-Cerium Alloys. R. H. Hiltz, Jr., and N. J. Grant. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 383-387.

Tested for rupture life at 426, 538 and 648° C. Improvement in strength over that of pure Ti.

(Q3q, R2s, 1-62; Ti-b, *Ce,* 1-60)

1448-Q. Work Hardening in the Latent Slip Directions of Alpha Brass During Easy Glide. W. L. Phillips, Jr., and W. D. Robertson. *Metallurgical Society of AIME, Transactions,* v. 212, June 1958, p. 406-412.

Stress-strain curves obtained for single crystals in tension and in shear. 29 ref.

(Q23a, Q24a, Q25n, J23; Cu-n, 14-61)

1449-Q. Effect of Hydrogen on Some Mechanical Properties of a Titanium Alloy Heat Treated to High Strength. H. A. Robinson, P. D. Frost and W. M. Parris. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 464-469.

Embrittlement of complex Ti-Mn alloy influenced by H_2 and heat treated strength. 7 ref.

(Q-general, 2-64, 2-69; Ti-b, *Mn, H*)

1450-Q. Internal Friction and Young's Modulus of Hexagonal and Cubic Cobalt. M. E. Fine and E. H. Greener. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 476-478.

9 ref. (Q21a, Q22, 2-62; Co)

1451-Q. Tensile Properties of Ti-20U and Ti-30U. H. A. Robinson, O. J. Huber and P. D. Frost. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 485-486.

A larger spread shown between yield and ultimate tensile strength than in heat treatable alpha-beta Ti alloys. (Q27; Ti-b, *U*)

1452-Q. Effect of Oxygen on Impact Transition of Iodide Titanium. E. H. Rennhack. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 487-489.

6 ref. (Q6n; Ti-b, *I,* 5-59)

1453-Q. Hydrogen in Titanium Aluminum Alloys. L. W. Berger, D. N. Williams and R. I. Jaffee. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 509-513.

Al increases H_2 solubility of alpha phase, thus increases impact embrittlement resistance. 7 ref.

(Q-general, M24b, M24c, 2-60; Ti-b, *Al, H, O, C*)

1454-Q. Plastic Flow of Molybdenum at Low Temperature. G. A. Alers, R. W. Armstrong and J. H. Bechtold. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 523-528.

Mo ductile in compression down to −196° C. Yield strength increases with decreased temperature. 12 ref.

(Q23, 2-62, 1-54; Mo)

1455-Q. Hydrogen, Crack Initiation and Delayed Failure in Steel. H. H. Johnson, J. G. Morlet and A. R. Troiano. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 528-536.

Delayed failure occurs by controlled initiation and growth of a crack. Incubation period of a crack which results from stress-induced

diffusion of H_2 to point of crack initiation measured. 14 ref.
(Q26q, 2-60, 3-66; ST, *H*)

1456-Q. Creep Characteristics of a Magnesium Single Crystal From 78 to 364° K. H. Conrad and W. D. Robertson. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 536-542.

Incremental loading creep tests conducted in tension and direct shear. Creep curves were transient in character and exhibited waves or periodic behavior. 23 ref.
(Q3, 2-63; Mg, 14-61)

1457-Q. Acoustical Study of Low Temperature Aging in Al-4.2% Cu. M. E. Fine and Charles Chiou. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 553-557.

While Gunier-Preston zones grow at room temperature, Young's modulus increases. Activation energy. 13 ref. (Q21a, N7a, 1-67; Al-b, *Cu*)

1458-Q. Role of Rate History Effects in the Calculation of Creep Behavior. J. D. Lubahn. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 557-563.

Tests, where strain rate in tensile test changed, showed a small rate-history effect to exist. If effect is neglected in calculation of creep behavior from tensile results, error occurs but may be neglected. 8 ref.
(Q3n, 3-69)

1459-Q. Temperature Dependence of the Yield Stress of Copper and Aluminum. W. D. Sylwestrowicz. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 617-624.

In tests on polycrystalline Cu and Al the ratio of the yield stress to the modulus of elasticity was found to be strongly dependent on temperature. 15 ref.
(Q21a, Q24, 2-61; Al, Cu)

1460-Q. Surface Deformation Differences Between Lead Fatigued in Air and in Partial Vacuum. K. U. Snowden and J. Neill Greenwood. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 626-627.
(Q7, 1-73; Pb)

1461-Q. Effect of Complexing on Mechanical Properties of Ti-6Al-3Mo Alloy. F. A. Crossley and W. F. Carew. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 630-635.

None of the more complex versions of the base alloy offers greater promise than Ti-7Al-3Mo alloy. However, some improvement in strength of the latter may follow from addition of Zr, perhaps up to 4%. 7 ref.
(Q-general, 2-60; Ti-b, *Al, Mo, Zr, Ge, Sn*)

1462-Q. Deformation of Single Crystals of Aluminum. J. M. Roberts and K. V. Gow. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 648-658.

Single crystals of Al oriented for single slip and duplex slip were deformed at 23, 300 and 600° C. at creep, normal and very rapid rates of straining. Study of the crystallography of deformation was made by optical examination of slip traces. 18 ref.
(Q24a, 2-66, 3-66; Al, 14-61)

1463-Q. Relations of High-Temperature Properties of a Ti + Al Hardened Nickel-Base Alloy to Contamination by Crucibles. R. T. Decker, John P. Rowe and J. W. Freeman. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 686-694.

Zirconium derived from melting in zirconia crucibles improved characteristics. Boron was more beneficial than Zr. 9 ref. (Q23, Q3q, 2-60, 2-62; Ni-b, *Ti, Al, Zr, B*)

1464-Q. Creep of Polycrystalline Alpha and Beta Thallium. Oleg D. Sherby. *Metallurgical Society of AIME, Transactions,* v. 212, Oct. 1958, p. 708-715.

Suggests that high-temperature creep rate is controlled by a dislocation climb process. 12 ref.
(Q3, 2-62; Tl)

1465-Q. High Temperature Deformation of Steels; a Study of Equicohesion, Activation Energies and Structural Modifications. C. Crussard and R. Tamhankar. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 718-730.

Dislocations during high-temperature intergranular and intragranular modes of deformation in Armco iron and 35-15 Ni-Cr austenite steel studied by tensile, creep and torsion tests. 30 ref. (Q24, P13a, Q27a, 2-62; Fe, SS-e, *Ni, Cr*)

1466-Q. Comparison of Creep Rupture Properties of Widdmanstatten and Equiaxed Structures of Ti-7Al-3Mo Alloy. F. A. Crossley and W. F. Carew. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 748-750.

5 ref. (Q3q, 3-71; Tl-b, *Al, Mo*)

1467-Q. Effect of Carbide Dispersion on the Strength of Tempered Martensite. A. M. Turkalo and J. R. Low, Jr. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 750-758.

Relationship between carbide spacing and tensile properties verified and extended data to finer structures using electron microscope. 13 ref. (Q27a, N7a; SS-c, *C*)

1468-Q. Fracture of Zinc-Monocrystals and Bicrystals. J. J. Gilman. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 783-791.

Small amounts of prior plastic glide and type of grain boundaries influence fracture stress. 40 ref. (Q26r, 3-71; Zn)

1469-Q. Grain Boundary Shear in Aluminum. F. Weinberg. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 808-817.

Measurements of boundary shear as function of time and effects of stress, temperature, boundary angle and added impurities. 10 ref. (Q2, 2-62, 3-69, 3-71, 3-68; Al)

1470-Q. Problem of Hydrogen Embrittlement of Iron. A. Siede and W. Rostoker. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 852-855.

H_2 depresses upper yield point and reduces yield point elongation and gives Fe strain aging kinetics; therefore, H_2 displaces C and N_2 from dislocation centers. 7 ref. (Q26s, 3-69; Fe, *H*)

1471-Q. High Temperature Properties of Nickel Alloy Powder Extrusions Containing Nonmetallic Dispersions. Eric Gregory and Claus G. Goetzel. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 868-874.

Stress-rupture tests on Ni-Cr alloy matrix at 1500 and 1800° F. Strength increased by oxide and carbide additions. 14 ref. (Q-general; 2-60, 2-62; Ni-b, *Cr,* AD-q40, 4-58, 6-72)

1472-Q. Residual Stresses in Welded Titanium Plates. E. F. Nippes and W. F. Savage. *Welding Journal,* v. 37, Oct. 1958, p. 433s-438s.

Effect of plate dimensions on the residual stresses produced by arc welding commercially pure and alloyed Ti plate; effect of preheat on the magnitude of longitudinal and transverse residual weld stresses in the alloyed plate; effects of cold treatment on the weld stresses in commercially pure Ti plate. (Q25h; 7-51, 4-53, Ti)

1473-Q. Correlation of Metallurgical Properties and Service Performance of Steel Plates From Fractured Ships. Morgan L. Williams. *Welding Journal,* v. 37, Oct. 1958, p. 445s-454s.

Relations between notch sensitivity, as measured by V-Notch Charpy energy criteria, service performance, chemical composition and grain size, as determined by statistical analyses of the accumulated data for 149 plates. 12 ref. (Q26, Q6, Q23s, T22g; *ST,* 4-53)

1474-Q. Toughness of Welds Evaluated Separately and in Composite. William P. Hatch, Jr., and Carl E. Hartbower. *Welding Journal,* v. 37, Oct. 1958, p. 455s-462s.

Comparison of transition curves of weld and heat-affected base metals tested separately and in combination. Findings confirm the validity and usefulness of the composite deformation-temperature transition curves for evaluating the relative toughness of weld and heat-affected base-metal structures. Simultaneous evaluation can be made of the notch toughness of weld metal and heat affected base metal from one series of test bars. 4 ref. (Q6, Q23s; ST, 4-53, 7-51)

1475-Q. Static Brittle-Fracture Initiation at Net Stress 40% of Yield. C. Mylonas, D. C. Drucker and J. D. Brunton. *Welding Journal,* v. 37, Oct. 1958, p. 473s-479s.

Static initiation of brittle fracture at low average net stress requires a great reduction of the usual ductility of steel. The criterion of brittleness of fracture initiation, whether with or without residual stresses, is a low average net stress at fracture. 18 ref. (Q26s, 3-66; ST, 4-53)

1476-Q. Further Evaluation of Ni-Cr-B and Au-18Ni Brazing Alloys. Winston H. Chang. *Welding Journal,* v. 37, Dec. 1958, p. 535s-542s.

Tensile and impact properties of brazed butt joints of AISI 347 and AISI 410. (Q27a, Q6, SS, Ni-b, Au-b, *Cr, B, Ni,* SGA-f)

1477-Q. Effects of Preheating Thermal Stress Relief and Electrode Type on Notch Toughness. L. J. McGeady. *Welding Journal,* v. 37, Dec. 1958, p. 543s-553s.

Comparative benefits in notch toughness realized through use of preheating for welding, as against thermal stress relief, or by changing from Type E6010 to Type E6016 electrode. 11 ref. (Q23s, J1a, K9, W29h; CN, 4-53)

SECTION R

CORROSION

1-R. Reaction Rate Study of the Dissolution of Low-Hafnium Zirconium in Hydrofluoric Acid Solutions. G. R. Hill and T. Smith. *First Nuclear Engineering and Science Congress,* v. 2, 1957, p. 63-69. (CMA)

The rate at which zirconium dissolves in HF solutions studied by tracer methods and found to be dependent on free acid concentrations alone. Temperature coefficient averages 3.34 k-cal. per mole for high stirring rates. The most likely mechanism of the slow step is diffusion of HF to the zirconium surface, but three others are also considered. 11 ref. (R6g; Zr)

2-R. Oxidation Behavior of Reactor Materials. R. A. U. Huddle. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 79-89.

Attempt to develop a theory of oxidation involving principles of crystal chemistry as opposed to electronic considerations which can be applied as a basis of alloying to improve oxidation resistance. Relation to oxidation behavior of nuclear fuels, canning materials, structural metals. 15 ref. (R1h, T11, 17-57)

3-R. Comparison of Sodium, Lithium, and Lead as Heat-Transfer Media From a Corrosion Standpoint. E. E. Hoffman and W. D. Manly. *First Nuclear Engineering and Science Congress,* v. 1, 1957, p. 128-137.

Types of corrosion which are found with the various liquid-metal container-material couples; corrosion mechanism and effect of various parameters on corrosion; best alloys for use with the three coolants. 5 ref.
(R6m; Na, Li, Pb, 14-60)

4-R. Corrosion Resistant Materials—Metals and Alloys (Continued). Lester F. Spencer. *Metal Finishing,* v. 55, Nov. 1957, p. 62-68.

Rates of attack of sulphuric and nitric acid and other corrodants on stainless steels, nickel and nickel-base alloys. Influence of concentration, temperature and oxidizing capacity of acid solution. 12 ref.
(R6g; SS, Ni)

5-R. Preliminary Report on Corrosion of Low-Uranium, Zirconium-Base Alloys. A. E. Dwight and A. H. Roebuck. Argonne National Laboratory. *U. S. Atomic Energy Commission,* ANL-5196, Oct. 1953, 30 p. (CMA)

The effects of heat treatment on the corrosion resistance of Zr-U alloys in 600° F. water vary with alloy composition. Tests on 57 compositions containing up to 9% U and some Sn, Pb, Sb, Bi, Y, Be, Ge, Cb, Ni and Al show best results with 2-6% U and 2-4% Sn. Water quenching gave best results for alloys made with crystal bar zirconium and alpha annealing the best for those made with sponge. (R4, 2-62, 2-60, 2-64; Zr, *U*)

6-R. Corrosion Behavior of Some Zirconium and Titanium-Base Boron Alloys in High-Temperature Water. D. C. Belouin and Ulrich Merton. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-UM-6, June 15, 1956, 11 p. (CMA)

Good corrosion resistance in hot water was apparent for Ti-1.75B. Adding 0.4% B to Zircaloy-2 increased the corrosion rate, which showed a transition after 1000 hr. (R4, 2-62; Zr, Ti, *B*)

7-R. Examination of Titanium Pulse Feeder Diaphragm Failure. T. M. Kegley, Jr. *U. S. Atomic Energy Commission,* CF-56-8-166, Aug. 24, 1956, 12 p. (CMA)

A diaphragm failed after 450 hr. service. One side of the diaphragm had been exposed to demineralized water and the other to a solution of UO_2SO_4. Both surfaces were covered with corrosion products, revealed by X-ray diffraction to be predominately TiO_2. Upon removal of the surface scale by brushing, the surface was found to be relatively unattacked. (R4, R6; Ti)

8-R. Examination of Recombiner Loop Specimens of Zr and Ti Alloys. M. K. Picklesimer. *U. S. Atomic Energy Commission,* CF-56-10-37, Oct. 2, 1956, 13 p. (CMA)

Samples of Ti, Zr, Zircaloy-2, Ti-6Al-4V and A-55 Ti were corroded in a recombiner loop. All showed some hydrogen pickup, especially Ti and Zr and all except Ti-6Al-4V showed recrystallization and grain growth. (R11, N3, N5; Zr, Ti)

9-R. Uniform Aqueous Corrosion of Aluminum—Effects of Various Ions. V. H. Troutner. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission,* HW 50133, June 10, 1957, 53 p.

36 ref. (R4; Al)

10-R. (Norwegian.) **High-Temperature Oxidation of Metals and Alloys.** Per Kofstad. *Teknish Ukeblad,* v. 104, Mar. 28, 1957, p. 249-254.

Oxidation of pure metals, connection between transport of ions and electrons and oxidation rate; influence of small amounts of impurities on oxidation rate; oxidation of superalloys. 27 ref. (R2h, 3-69)

11-R. (Swedish.) **Corrosion in Car Bodies.** E. Br. *Teknisk tidskrift,* v. 87, Mar. 26, 1957, p. 299-300.

Research on nonprotective "deep rust" in protected parts of the motor car; influence of alloy materials on the sheet metal's resistance against different kinds of corrosion. (R general, T21a; ST)

12-R. Corrosion in Engineering. *Corrosion Prevention and Control,* v. 4, Oct. 1957, p. 44-51.

Preventive measures. (R10)

13 R. Corrosion Engineering Research. *Corrosion Prevention and Control,* v. 4, Oct. 1957, p. 53-56.

Improved Li-based multipurpose greases; corrosive action of soluble cutting oils. (R7e; SGA-c, Li)

14-R. Cathodic Protection of Brewery Liquor Tanks. A. W. Hubbard. *Corrosion Prevention and Control,* v. 4, Oct. 1957, p. 57-58.

(R10d; CI)

15-R. Cathodic Protection in Isreal. Pt. 2. On Sea and in the Home. D. Spector. *Corrosion Technology,* v. 4, Sept. 1957, p. 306-309.

Cathodic protection of Israel's fishing fleet and household hot water boilers by means of magnesium anodes. (R10d; Mg)

16-R. Cathodic Protection of Underground Refinery Equipment. P. W. Sherwood. *Corrosion Technology,* v. 4, Sept. 1957, p. 313-317.

Basic elements of cathodic protection, methods used in accumulating data needed for designing protection system; choice of galvanic anodes for external power source; location and design of anodes. 5 ref. (R10d)

17-R. The British Iron and Steel Research Association. Pt. 1. Corrosion of Bare Ferrous Metal. J. C. Hudson. *Corrosion Technology,* v. 4, Sept. 1957, p. 320-324.

Tests on atmospheric corrosion of carbon and low-alloy steels under variety of climatic conditions; effects of atmospheric pollution and of small Cu or Cr additions to steel; corrosion in soil and sea water. (To be continued.)
(R3, R4, R8; ST, *Cu, Cr*)

18-R. High Temperature Oxidation of Silicon. J. T. Law. *Journal of Physical Chemistry,* v. 61, Sept. 1957, p. 1200-1205.

(R2h; Si)

19-R. The Corrosion Engineer and His Contribution to an Economic Underground Pipeline Project. Anthony Gross. *Pipes and Pipelines,* v. 2, Oct. 1957, p. 25-31.

(R8; 4-60)

20-R. Rusting and Its Cost to Farming. E. E. White. *World Crops,* v. 9, Oct. 1957, p. 406-409.

Examples, and methods of prevention in farm equipment.
(R general, T3)

21-R. (German.) **Resistance of Aluminum to Mortars.** E. Fischer and H. Vosskühler. *Aluminium,* v. 33, Sept. 1957, p. 606-612.

Resistance to corrosive agents in building materials can be increased by surface protection with lacquers, bituminous paints or greasing. 3 ref. (R6n; Al)

22-R. (German.) **Corrosion Resistance of Austenitic Chromium-Nickel Steels.** W. Katz. *Draht,* v. 8, Aug. 1957, p. 317-321.

Variations in composition permit adaption for many applications. 20 ref. (R general, 2-60; SS, *Cr, Ni*)

23-R. (German.) **White Scale on Zinc-Plated Products. Its Prevention.** Karl Daeves. *Draht,* v. 8, Aug. 1957, p. 334-335.

White scale is a mixture of basic zinc carbonate and zinc oxide, caused by continued exposure to water. Sealing in oil paper and dipping in chromate solutions previous to shipping or storing was not satisfactory. Sufficient ventilation and prevention of excessive temperature fluctuation in storage rooms gave good results. 13 ref. (R2q; Zn, 8-62)

24-R. (Japanese.) **Effect of Manganese Dioxide on the Corrosion of Zinc Plates in Dry Cells.** K. Ninomiya and K. Sasaki. *Electrochemical Society of Japan, Journal,* v. 25, June 1957, p. 325-328.

Corrosion by managanese dioxide, oxygen and various metal ions. (R6; Zn)

25-R. (Russian.) **Texture of Iron Scale. Pt. 10. Texture of Ferrous Scale.** V. I. Arkharov and M. I. Simonova. *Fizika Metallov i Metallovedenie,* v. 4, no. 2, 1957, p. 278-290.

Oxidation conditions; measurement of crystalline lattice of ferrous oxide; X-ray photographs of ferrous oxide crystals. 8 ref. (R1h, R2q; Fe)

26-R. (Russian.) **Magnetostriction Vibrator Testing of the Effect of Shot Peening on the Cavitation-Corrosion Resistance of Metals.** L. A. Glikman and Yu. E. Zobachev. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 38-41.

Investigation did not disclose positive influence of shot peening on resistance to cavitation corrosion. 5 ref. (R2m, G23n)

27-R. (Russian.) **Corrosion Resistance of Metals to Natural Gas Containing Sulphuric Acid.** V. M. Nikiborova and N. A. Reshetkina. *Metallovedenie i Obrabotka Metallov,* no. 5, May 1957, p. 55-62.

Chromium plated steel and cast iron resist corrosion, while galvanized or aluminized gray cast iron does not. 8 ref. (R7k; ST, CI, 8-62, 8-65)

28-R. (Russian.) **Experience of Czechoslovak Industry in Protecting Equipment to be Exported to Tropical Countries.** A. V. Ryabchenkov, V. M. Nikiforova, N. B. Nezvanova and B. D. Samuylenko. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1957, p. 59-63.

Various methods and materials used as protective covering on merchandise and machinery against exposure. Some protective coatings are heavily charged with fungicide. (R10f)

29-R.* **Corrosion Control Methods.** *American Gas Journal,* v. 184, Sept. 15, 1957, p. 98-99.

Coatings, extra pipe wall thickness, cathodic protection, combinations of these methods for protection for underground piping; types of cathodic protection equipment. (R10; 4-10)

30-R.* **High-Temperature Oxidation and Contamination of Niobium.** William D. Klopp, Chester T. Sims and Robert I. Jaffee. *American Society for Metals, Transactions,* v. 50, Preprint no. 64, 1957, 27 p.

Oxidation and contamination rates of Cb in oxygen and in air were measured in the temperature range 600 to 1200° C. The oxidation curves in oxygen were linear and the rate constants were correlated by an Arrhenius-type plot. The activation energy for diffusion of oxygen in Cb was calculated from contamination data. Contamination in air-reacted Cb was similar to that in oxygen-reacted Cb, suggesting that oxygen is the primary diffusing contaminant. 13 ref. (R1h, N1; Cb)

31-R.* **Corrosion, Pyrophoricity, and Stress-Corrosion Cracking of Titanium Alloys in Fuming Nitric Acid.** J. B. Rittenhouse. *American Society for Metals, Transactions,* v. 51, Preprint no. 68, 1957, 43 p. (CMA)

Studies of the attack of fuming HNO_3 on Ti and Ti-8Mn showed that ignition sensitivity depended on the presence of fine particles on the surface, that stress-corrosion cracking occurred in Ti when the NO_2 content exceeded 6.5% (H_2O less than 0.7%) and in Ti-8Mn when NO_2 exceeded 0% (H_2O less than 0.8%). The corrosion-time relations of the metals in fuming HNO_3 with 20% NO_2 were measured in the range 25-71° C. 18 ref. (R6g, R1d; Ti)

32-R.* **Studies of the Oxidation and Contamination Resistance of Binary Niobium Alloys.** Chester T. Sims, William D. Klopp and Robert I. Jaffee. *American Society for Metals, Transactions,* v. 51, Preprint no. 70, 1957, 33 p.

Effects of binary alloying additions. The alloys contained up to 35 at. % Ti, Cr and Zr, 25 at. % V, Mo, Ta and W, and 5 at. % Be, B, Co, Fe, Mn, Ni and Si. The oxidation and contamination studies were conducted in air at 600, 800 and 1000° C. 8 ref. (R1h, 2-60; Cb)

33-R.* Stress-Corrosion Cracking of Insulated Austenitic Stainless Steel. A. W. Dana, Jr. *ASTM Bulletin,* no. 225, Oct. 1957, p. 46-52.

Stress-corrosion cracking which may occur when austenitic stainless steel piping is exposed to moist thermal insulating materials is believed to result from the action of water-soluble chlorides leached from the insulations. Chemical analyses showed that water-soluble chlorides are present in 85% magnesia, calcium silicate and glass fiber insulating materials, with little difference in chloride level between them. (R1d, R6; SS, 4-60)

34-R.* Resistance of Cast Iron to Cavitation Erosion. R. I. Higgins. *British Cast Iron Research Association Journal of Research and Development,* v. 7, Oct. 1957, p. 28-53.

Tests carried out on the jet impact machine and the magnetostriction apparatus. In the jet impact machine the specimens are rotated at a high speed through a jet of water. The calculated impact pressure is about 7.5 tons per sq. in. In the magnetostriction apparatus the specimen is vibrated in water at a high frequency (10,000 cycles per sec.) but through a very small amplitude. 8 ref. (R2m, 1-53; CI)

35-R. Corrosion of Metals in Buildings. R. W. Bailey and H. G. Ridge. *Chemistry and Industry,* v. 76, Sept. 1957, p. 1222-1227.

Performance of Zn and Zn sheet products in and on buildings, with steel protected from rust by means of a Zn coating, and with the behavior of Zn alloy die-cast builders' hardware. 16 ref. (R3, T26n; Zn)

36-R. A Review of Telephone Cable Corrosion Problems. *Corrosion,* v. 13, Oct. 1957, p. 134-137.

Usual practice and problems with suggestions for improving methods in making surveys of bare ducted cables. (R8, T1b; Pb)

37-R. Use of Stainless Steel to Combat Corrosion in the Chemical Industry. Pt. 2. *Corrosion,* v. 13, Oct. 1957, p. 138-146.

Pitting, concentration cell attack, sensitization, stress-corrosion cracking and hot shortness in stainless steels; relative susceptibility of common types to these defects; examples of failure. 26 ref. (R2; SS)

38-R. Artificial Insulating Joints for Stray Current Mitigative Measurements. G. H. Cantwell. *Corrosion,* v. 13, Oct. 1957, p. 616t-618t.

Method for applying direct current between structure and earth simulating an insulating joint making it possible to determine effect of insulating joint without placing temporary joints. (R1g)

39-R.* Corrosion of Austenitic Stainless Steels in Sulfuric Acid. E. H. Phelps and D. C. Vreeland. *Corrosion,* v. 13, Oct. 1957, p. 619t-624t.

Corrosion resistance of AISI Types 304, 310, 316, 317, 321 and 347 in saturated sulphuric acid solution at 30°, 50° and 70° C. Results presented in terms of "active passive" regions. Use of potential measurements for determination. 6 ref. (R6g; SS)

40-R. Standardization in the Field of Corrosion and Corrosion Protection in Germany. *Corrosion,* v. 13, Oct. 1957, p. 625t-626t.

Tabulates status of German standardization relating to corrosion, corrosion protection by chemical, electrochemical or galvanic coating and testing of metallic industrial materials. (R10, R11, S22)

41-R.* Corrosion and Metal Transport in Fused Sodium Hydroxide. Pt. 2. Corrosion of Nickel-Molybdenum-Iron Alloys. G. Pedro Smith and Eugene E. Hoffman. *Corrosion,* v. 13, Oct. 1957, p. 627t-630t.

Study of corrosion by fused sodium hydroxide of nickel-rich alloys at 815° C. for 100 hr.; reaction mechanism with Ni-Mo and Fe alloys found to involve removal of Fe and Mo from solid solutions with Ni. 8 ref. (R6s, R1; Ni, Mo, Fe)

42-R.* Sulfide Corrosion Cracking of High-Strength Bolting Material. Donald Warren and G. W. Beckman. *Corrosion,* v. 13, Oct. 1957, p. 631t-646t.

Behavior of AISI Type 4140 bolts in aqueous H_2S systems at 20 to 120° C. and pressures of 1 to 17 atm.; effect of bolt hardness, stress and plastic deformation; protection by metallic coating and corrosion inhibitors, mechanism of corrosion cracking of 4140 bolts. 24 ref. (R6g, T7f; AY)

43-R. Titanium, Zirconium and Tantalum for Control of Corrosion. William E. Lusby, Jr. *Corrosion,* v. 13, Oct. 1957, p. 654t-658t.

Corrosion resistant properties and progress in process application. 20 ref. (R general; Ti, Zr, Ta)

44-R.* High Alloys to Combat Corrosion. E. D. Weisert. *Corrosion,* v. 13, Oct. 1957, p. 659t-671t.

Corrosion resistant properties, mechanical properties, welding characteristics, general fabrication characteristics and heat treatment of Ni-Mo, Ni-Mo-Cr, Ni-Cr-Fe-Mo, Co-W-Ni, Co-W-C, Fe-Si, Fe-Si-Mo, and Ni-Si alloys. Applications in highly corrosive conditions in industries. 32 ref. (R general; SGA-g)

45-R.* Quantitative Comparison of Surface Finishes and Heat Treatment of Stainless Steel With Respect to Corrosion by Jet Fuels. R. G. Carlson. *Corrosion,* v. 13, Oct. 1957, p. 672t-676t.

Samples of AISI 440° C. stainless steel were hardened and tempered at different temperatures and given one of five different surface finishes and subjected to corrosive environment consisting of JP-4 fuel above water. Corrosion rates found for different surfaces and tempering treatments. (R7d, 2-64; SS)

46-R.* Growth of Ferrous Sulfide on Iron. R. A. Meussner and C. E. Birchenall. *Corrosion,* v. 13, Oct. 1957, p. 677t-689t.

Rate and nature of growth in sulphur vapor between 650 and 900° C. with vapor pressure of 10 to 500 mm. of mercury. Self-diffusion coefficient calculated for iron ions. 16 ref. (R6p, N1d; Fe)

47-R.* A Laboratory Study of N-Oleoyl Sarcosine as a Rust Inhibitor in Some Petroleum Products. Robert M. Pines and John D. Spivack. *Corrosion,* v. 13, Oct. 1957, p. 690t-694t.

Effectiveness of inhibitor in gasoline, mineral oil or silicon lubricants in preventing corrosion of steel specimens; provides effective inhibition under static and dynamic immersion test as well as in presence of humid atmospheres. 12 ref. (R10b, R11; ST)

48-R.* Plastic Flow of Iron Oxides and the Oxidation of Iron. J. D. Mackenzie and C. E. Birchenall. *Corrosion,* v. 13, Dec. 1957, p. 783t-785t.

Under certain conditions, the oxidation of Fe in oxygen at high temperatures is accompanied by the formation of a central box-like cavity the dimensions of which are identical to those of the original Fe specimen. The decrease in size of this cavity with increasing temperature and its disappearance when the formation of magnetite and hematite is excluded by a controlled oxidizing potential indicate the plastic properties of the oxides to be an important factor. Measurement of the relative plasticity of the three oxides at 800-1000° C. in a specially designed apparatus confirms this. 7 ref. (R1h; Fe)

49-R. Compatibility of Aluminum With Alkaline Building Products. C. J. Walton, F. L. McGeary and E. T. Englehart. *Corrosion,* v. 13, Dec. 1957, p. 807t-816t.

Tests under a variety of conditions. Chemistry of reactions between Al and alkaline building products; results of a series of laboratory tests. Aluminum corrodes only superficially and this corrosion is self-limiting in nature. 9 ref. (R1, R6; Al)

50-R.* Polarization in the Corrosion of Ice Breakers. J. H. Greenblatt. *Corrosion,* v. 13, Dec. 1957, p. 817t-820t.

Measurement of polarization characteristics of steel coupons subjected to the usual treatments given ship plating indicates that cathodic depolarization is the major factor influencing corrosion. At low temperatures in oxygenated water considerable anodic polarization occurred which would tend to mitigate corrosion. Results discussed in terms of observed corrosion patterns on the hulls of vessels operating in ice. (R1, R4; T22g)

51-R. Inhibiting Effect of Hydrofluoric Acid in Fuming Nitric Acid on Liquid and Gas Phase Corrosion of Several Metals. David M. Mason, Lois L. Taylor and John B. Rittenhouse. *Corrosion,* v. 13, Dec. 1957, p. 821t-827t.

Measurements at 130° F. of corrosion of several metals exposed to the liquid and the gas phase of thermally stable nitric acid containing 11 to 13% NO_2 and 2 to 4% water with and without hydrofluoric acid added as a corrosion inhibitor. 7 ref. (R6g, R10b)

52-R.* Fretting Corrosion as an Engineering Problem. K. H. R. Wright. *Corrosion Prevention and Control,* v. 4, Nov. 1957, p. 37-44.

Characteristics and mechanism of fretting corrosion; surface treatments and lubrication; fretting corrosion and fatigue. (R1f)

53-R.* Black Oxide Coatings on Steel: Quality Tests. J. Doss. *Electroplating and Metal Finishing,* v. 10, Sept. 1957, p. 289-290.

Steel panels treated in aqueous alkaline oxidizing bath to produce black magnetic oxide coatings were tested by oxalic acid, imbibation, humidity cabinet, citrate tests. The oxalic acid spot test found most reliable. (R11, L14a; ST)

54-R. Influence of Surface Pretreatment on the Atmospheric Oxidation of 2S (U. S. Alloy 1100) Aluminum. Philip M. Aziz and Hugh P. Godard. *Electrochemical Society, Journal,* v. 104, Dec. 1957, p. 738-739.

(R1h, 3-70; Al)

55-R.* Recent Metallurgical Problems in Marine Engineering. B. Tood. *Institute of Marine Engineers, Transactions,* v. 69, Aug. 1957, p. 320-325.

Examples of corrosion of condenser tubes, propeller shaft liners, ships' side valves of spheroidal graphite iron; brittle fracture of wrought iron anchor cables; fatigue failure of diesel engine pistons of spheroidal graphite iron; causes and preventives. 11 ref.
(R4b, Q26s, Q7, T22; CI)

56-R.* Stopping Corrosion With Rust Preventive Compounds. R. P. Mills. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 96-100.

Nature of corrosion and its prevention by petroleum rust preventive compounds. (R10b)

57-R.* Corrosion Resistant Materials—Metals and Alloys. Pt. 2. Lester F. Spencer. *Metal Finishing,* v. 55, Nov. 1957, p. 62-68.

Effect on Types 430, 302, 304, 347 stainless steels and nickel alloys of a variety of acid solutions. 12 ref. (R6g; SS, Ni)

58-R.* Scaling of Billets. Pt. 3. J. Moreau and M. Cagnet. *Metal Treatment and Drop Forging,* v. 24, Nov. 1957, p. 456-458.

Ordinary bessemer, oxygen bessemer and openhearth steels were studied. Influence of reheating time on total thickness of the scale, depth of contamination and decarburization; influence of reheating temperature, furnace atmosphere and quality of steel. 8 ref.
(R2q; ST, 4-52)

59-R. Corrosion in 650° F. Degassed Water of Uranium-Molybdenum Alloys Containing Impurity Additions. E. W. Cawthorne, et al. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1045, Oct. 6, 1955, 6 p. (CMA)

(R4d; U, *Mo)*

60-R. Investigation of Scaling of Zirconium at Elevated Temperatures. Quarterly Status Report No. 16 for Mar. 2, 1957 to June 2, 1957. H. B. Prebst, E. B. Evans and W. M. Baldwin, Jr. *U. S. Atomic Energy Commission,* AECU-3529, June 6, 1957, 5 p. (CMA)

(R2q; Zr)

61-R. Scaling of Zirconium and Zirconium Alloys. J. A. Burka, C. S. Crouse and R. E. Swift. *U. S. Atomic Energy Commission,* AECU-3661, Aug. 1957, 40 p. (CMA)

11 ref. (R2q; Zr)

62-R. (French.) **Electrochemistry and Corrosion.** M. Pourbaix. *Corrosion et Anticorrosion,* v. 5, no. 9, Sept. 1957, p. 230-240.

Fundamental research in thermodynamics and electrochemical kinetics applied to corrosion. General conditions of electrochemical equilibrium between metals and their oxides and theoretical conditions of corrosion plotted in diagrams versus the pH of the solution. The thermodynamic study of polarization curves gives a precise idea of the possibility of corrosion in many cases. (R1)

63-R. (French.) **General Aspects of the Theory of Corrosion.** R. Piontelli. *Corrosion et Anticorrosion,* v. 5, no. 9, Sept. 1957, p. 241-243.

The concepts of total work of transformation and resistance of transformation. Definitions of immunity, cathodic protection and passivity. (R1, R10, 10-51)

64-R. (French.) **The Corrosion Engineer as a "Planner".** Jacques Baudin. *Corrosion et Anticorrosion,* v. 5, Oct. 1957, p. 269-274.

Duties of corrosion protection departments in manufacturing plants, their relation to other departments. (R general, A5b)

65-R.* (French.) **Corrosion Phenomena in Tubular Condensers. Some Typical Examples, Preventives and Correctives.** A. J. Maurin. *Corrosion et Anticorrosion,* v. 5, Oct. 1957, p. 275-285.

Definition and description of a tubular condenser. Detailed analysis

of cases of salt water corrosion in Texas plants of Dow Chemical Co. involving condenser elements in Cu, Cu alloy, steel, cast Fe, Al brass and Muntz metal as influenced by chlorination, cathodic protection, protective coverings, speed of circulation of water, presence of air, filtration of system water, periodic cleaning of system, iron content of water, respective locations of parts subject to corrosion. (To be continued.) (R4b, T1e; Cu, ST, CI)

66-R.* (French.) **Electrochemistry and Corrosion.** (Concluded.) M. Pourbaix. *Corrosion et Anticorrosion,* v. 5, Oct. 1957, p. 286-293.

Corrosion behavior of Fe in bicarbonate of sodium solutions of varying pH; of 18-8 stainless steel in acetic and acetate solutions with and without NaCl; influence of chlorides and phosphates on corrosion of Fe and common steel; conditions required for passivation; practical application of theories deduced from observations (e.g., corrosion protection of reinforcement Fe in concrete towers for overhead electric lines); methods of calculating corrosion rate of metals and alloys used in nuclear reactors, boilers, autoclaves, etc., at high temperatures and pressures. 42 ref. (R1, R2; ST, CI)

67-R. (French.) **Protection of Cables Against Corrosion.** M. Osty. *Corrosion et Anticorrosion,* v. 5, Oct. 1957, p. 294-298.

Water-tight coatings in various plastic materials of in asphalt-glass base composition have proved their effectivness on samples of cable subjected to an electrolytic action in an acid medium. (R7b, L26p, L26c; NM-g)

68-R. (French.) **Influence of Oxidation on the Superficial Chemical Composition of Refractory Alloys.** F. Malamand and G. Vidal. *Métaux-Corrosion-Industries,* no. 383-384, July-Aug. 1957, p. 286-299.

Study of oxidation by determination of superficial modification of chemical composition of the metallic layer underlying the oxide layer. Spectrographic method used in the case of refractory alloys (nimonic), from gas turbines. 22 ref. (R1h, S11k; EG-d, Ni)

69-R. (French.) **Prevention of Corrosion by Brine.** A. Maringe. *Revue Pratique du Froid,* no. 138, p. 41-44.

Typical cases of corrosion by cooling solution systems in breweries and ice plants; study of corrosion causes, remedies, preventives. (R4f, R10, W10g)

70-R. (German.) **Stress-Corrosion Testing Methods for Brass Compared With Long-Term-Storage Tests.** S. Hellsing, O. Lissner, S. Rask and B. Strom. *Werkstoffe und Korrosion,* v. 8, Oct. 1957, p. 569-573.

Mercury nitrate and ammonia tests are more severe than two years of storage (cartridge cases under rain shelters). 13 ref. (R11s, 1-15; Cu)

71-R. (German.) **Influence of Trace Elements on Anti-Scaling Properties of Heat Resistant Alloys.** H. Pfeiffer. *Werkstoffe und Korrosion,* v. 8, Oct. 1957, p. 574-579.

Ca and Ce among other trace elements impart improved oxidation resistance; effectiveness is caused by an increased adhesiveness of the oxide layer which is formed during high-temperature heating. Results of X-ray, photographic and supermicroscopic investigations of the formation of oxide layers on Fe-Cr-Al alloys. 20 ref. (R2q; 2-60; SGA-h, AD-n)

72-R.* (German.) **Austenitic Corrosion Resistant Nickel-Molybdenum Cast Alloys.** W. Gödecke. *Werkstoffe und Korrosion,* v. 8, Oct. 1957, p. 580-587.

Hastelloys of B and C types were subjected to electrochemical and metallographic investigation. The former could not be passivated while the latter showed some passivation inclination. Phase structure showed improved coefficients of extension, tenacity, plastic deformation and workability. Corrosion resistance and electrochemical properties of the one-phase solid solution B and C types were equal to the intermetallic two-phase commercial hastelloy. (R10c, P15, 2-60; Ni, Mo)

73-R. (German.) **Corrosion in High-Temperature Boilers.** Max Werner. *Werkstoffe und Korrosion,* v. 8, Oct. 1957, p. 587-596.

Experience with corrosion of highly heat resistant steels in 600° boilers after 40,000 hr. of operation. (R2q, R4c; 2-62, 3-67; SS)

74-R. (German.) **New Methods of Iron Protection in Soils.** T. Markovic. *Werkstoffe und Korrosion,* v. 8, Oct. 1957, p. 596-602.

Soil structure; ratio of soil water to soil air; artificial aeration cells. 19 ref. (R8, R10; 2-60; Fe)

75-R. (German.) **Rubber for Protection Against Corrosion.** *Werkstoffe und Korrosion,* v. 8, Oct. 1957, p. 603-606.

A survey of mechanical and chemical properties of rubber coatings on pipe. (R10f, L26; NM-g

76-R. (French-German.) **Antirust Coatings and Welding.** R. Clément. *Zeitschrift für Schweisstechnik,* v. 47, Sept. 1957, p. 212-219.

On welded constructions, the antirust coatings are very often altered along welds. The cause is a carbonate deposit. Means to aviod this corrosion. (R general; 7-51)

77-R. (Japanese.) **On the Corrosion Resistance of Titanium Alloys. Pt. I. Relation Between the Corrosion Resistance and the Electrode Potentials of Titanium Alloys.** Hideo Nishimura and Tsuyoshi Hiramatsu. *Japan Institute of Metals, Journal,* v. 21, July 1957, p. 465-469. (CMA)

A corrosion resistance study of alpha and beta solid-solution binary alloys of titanium in 20% HCl. Electrode potentials and time-potential curves were measured. Effects of alloy additives on corrosion resistance to HCl, H_2SO_4 and oxalic acid at different concentrations and temperatures. (R6g; Ti)

78-R. (Japanese.) **Corrosion Resistance of 28 Aluminum in Hot Water With Respect to the Ratio of Its Iron and Silicon Content.** Yoshitsugu Mishima. *Light Metals,* v. 7, July 1957, p. 51-57.

28 Al-containing Fe and Si in 4:1 ratio has good corrosion resistance to water at 120-300° C. for reactor applications. 5 ref. (R4d; 2-60; Al)

79-R. (Japanese.) **Corrosion Resistance of Aluminum and Its Alloys in High-Temperature Water.** Yuzo Nakamura, Satoshi Sugino and Motoi Nishizaka. *Light Metals,* v. 7, July 1957, p. 58-64.

Ni, Co, Fe or Mn improve corrosion resistance; Ni is most effective. (R4d, 2-60)

80-R. Corrosion Fatigue. T. D. Weaver. *Chemistry and Industry,* v. 36, Sept. 7, 1957, p. 1194.

Deleterious effect of combined corrosion and cyclic stress, mechanism of failure under such conditions, counter-measures which can be taken. 13 ref. (R1e; ST)

81-R.* Action of Fused Nitrates of Lithium, Sodium and Potassium on Nickel, Copper, Duralumin and Certain Steels. E. I. Gurovich. *Journal of Applied Chemistry of the U.S.S.R.,* v. 29, Sept. 1956, p. 1461-1466. (Translated by Consultants Bureau, Inc.)

Corrosion by nitrates was found to depend on time and temperature and to consist of two processes, namely, solution of metal and oxide film formation. Data obtained introduced certain complications into observed dependence of corrosion on position of cations of nitrates in Mendeleev's periodic table. Some of the films formed on the metals may be of practical importance for decorative coloration of the metals or as a means of preparing the surface of carbon steels for painting, to provide a firmer attachment of the paint coating. 26 ref. (R6k; Ni, Cu, Al, ST)

82-R.* Use of Naphthenate Soap for Protection of Powdered Copper Against Corrosion. A. V. Pomosov and E. E. Krymakova. *Journal of Applied Chemistry of the U.S.S.R.,* v. 29, Sept. 1956, p. 1543-1544. (Translated by Consultants Bureau, Inc.)

Reliable results are obtained by treatment of Cu powder with a soda solution containing 0.05% naphthenate soap and 0.05% soda. 4 ref. (R10a; Cu, 6-68)

83-R. Additions on the Hot Water and Steam Corrosion Resistance of Zirconium. G. L. Frederic, R. H. Robertson and R. L. Carpenter. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BM-11-92, July 9, 1954, 18 p. (CMA)

Additions of Cb and Ta to Zr-1Sn did not improve corrosion resistance to hot water and steam. (R4d, 2-60; Zr, *Sn, Ta, Cb*)

84-R. Effects of Ternary Alloying Additions on the Corrosion Resistance of Epsilon-Phase Uranium-Zirconium Alloys. J. E. Reynolds, et al. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1087, Apr. 27, 1956, 31 p. (CMA)

5 ref. (R4d, 2-60; U, Zr, *Cr, Ti, Al, Ta, W, V, Pt*)

85-R. Analysis of Zircaloy II Corroded by Diphenyl. F. D. Leipziger. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-FDL-1, May 31, 1956, 8 p. (CMA)

Corrosion resistance of Zircaloy-2 to diphenyl. (R7g; Zr)

86-R. Corrosion Studies of Crystal Bar Zirconium in Organic Coolants. J. G. Gratton. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-JGG-1, Oct. 18,

1956, 9 p. (CMA)
(R7; Zr, 5-67)

87-R. (Czech.) Application of 2 Methyl Butanol—2-Chromate as an Inhibitor. L. Cerveny and R. Bartonicek. *Czechoslovak Chemical Communication, Collections,* v. 22, June 1957, p. 908-913.

For passivation of steel. 8 ref. (R10c; ST)

88-R. (German.) Corrosion Studies. Pt. 12. Influence of Strain Energy Upon the Solution Speed of Metals. I. Sekerha and O. Vanicek. *Czechoslovak Chemical Communications, Collection,* v. 22, June 1957, p. 705-711.
11 ref. (R1d; Zn)

89-R. (German.) Corrosion Studies. Pt. 13. Corrosion of Zinc in Chloride Solutions. I. Sekerha and K. Smrcek. *Czechoslovak Chemical Communications, Collection,* v. 22, June 1957, p. 712-719.

17 ref. (R6g; Zn)

90-R. (German.) Corrosion as an Electrochemical Process. F. W. Hill. *Praktische Chemie,* v. 8, Aug. 1957, p. 238-243.

Form and extent of corrosion of steel construction when submitted to uncontrolled electrochemical reactions. (R1a; ST)

91-R. (German.) Service Life of Sheet Steel Pilings in Fresh Water Installations. Otto Schneider. *Wasser und Boden,* v. 9, Sept. 1957, p. 358-360.
(R4a; ST)

92-R. (German.) Corrosion and Corrosion Tests. Anton Schwartz. *VDI Zeitschrift,* v. 99, Sept. 1, 1957, p. 1249-1250.

23 ref. (R1, R11)

93-R.* (Italian.) Kinetics of the Dissolution of Iron in an Acid Medium. Pt. 1. Action of Adsorbed Hydrogen. Liliana Felloni and Giampaolo Bolognesi. *Annali di Chimica,* v. 47, Sept. 1957, p. 985-995.

Dissolution tests in HCl at 25° C. were conducted on samples of Armco iron of various thickness-area ratios. It appears, from analysis of the results, that the reaction consisting of combination of H atoms takes place at active points on the metal surfaces. The process of absorption, which occurs at different points, after achievement of a dynamic equilibrium inside the metal, appears to influence the total process of dissolution of iron and evolution of H, either as a result of polarization, through attainment of a certain maximum speed of diffusion, or as a result of a change, caused by absorption, in the crystal lattice. 17 ref. (R6g; Fe, *H*)

94-R.* (Italian.) Kinetics of the Dissolution of Iron in an Acid Medium. Pt. 2. Action of Certain Additives in Relation to Adsorbed Hydrogen. Liliana Felloni and Giampaolo Bolognesi. *Annali di Chimica,* v. 47, Sept. 1957, p. 996-1004.

Dissolution tests in HCl were conducted on samples of Armco iron to observe interaction caused by addition of inhibitor on quantity of H adsorbed. Iron dissolved at end of tests was determined, and kinetics of evolution of H, in presence of ethyl alcohol and of o-tolylthiourea, were followed. Action of inhibitors is characterized as deterrent to increase in overvoltage. 11 ref. (R6g, R10b; Fe, *H*)

95-R. (Japanese.) Anticorrosive Effects of Maleic Anhydride Derivatives. N. Wada, Y. Shigeno, Y. Shimoda and S. Nakagawa. *Chemical Society of Japan, Journal: Industrial Chemistry Section,* v. 60, Aug. 1957, p. 1042-1044.
(R10b)

96-R. (Italian.) Contribution to the Theory of the Phenomena of Electrochemical Corrosion. Roberto Piontelli. *Istituto Lombardo di Scienze e Lettere, Rendiconti,* v. 91, no. 1, 1957, p. 237-256.

Theoretical presentation of general aspects of electrochemical corrosion and of conditions of immunity, cathodic protection, and passivity. 10 ref. (R1a)

97-R. (Italian.) Corrosion by Stray Currents. T. A. Turco. *Pitture e Vernici,* v. 13, Sept. 1957, p. 589-592.

Mechanism of corrosion by stray currents and newer methods of combatting same, including electrical measures and coatings of various types. 8 ref. (R1j)

98-R. Examination of a Failed Type 347 Stainless Steel Drum Used for the Storage and Shipping of Fuming Nitric Acid. P. R. Kosting and A. K. Wong. Watertown Arsenal. *U. S. Office of Technical Services,* PB 131112, June 1954, 23 p. $.75.
(R7b, W12c; SS)

99-R. (French.) Corrosion-Erosion. I. Ming-Feng and B. G. Rightmire. *Navires, Ports et Chantiers,* v. 8, Oct. 1957, p. 757-759, 785.

Mechanism of corrosion; a curve represents the weight of lost metal

as a function of number of effective cycles. (R1c)

100-R. (German.) **Resistance to Corrosion of Condenser Tubes Made of Copper Alloys.** K. Eichhorn. *Werkstoffe und Korrosion,* v. 8, Nov. 1957, p. 657-668.

35 ref. (R4, 4-60; Cu)

101-R.* (German.) **Sodium Benzoate as Corrosion Inhibitor in Aqueous Dispersions.** H. J. Freier and W. Geilenkirchen. *Werkstoffe und Korrosion,* v. 8, Nov. 1957, p. 673-677.

Sheet metals intended for containers for aqueous varnish dispersions are protected from corrosion by additives of sodium benzoate, or sodium benzoate-sodium nitrite. Protection depends mainly on acidity. Additions of 2% or less are effective. 9 ref. (R10b)

102-R. (German.) **Electrochemical Mechanism of the Inhibiting Action of Lead Oxides on Iron.** J. D'Ans, W. Breckheimer and H. J. Schuster. *Werkstoffe und Korrosion,* v. 8, Nov. 1957, p. 677-688.

Lead dioxide is ineffective because its high electric conductivity causes local cells. Reaction compounds of divalent Pb generate a protective coating on the basis metal which protects against corrosion. 7 ref. (R1, 2-66; Pb, Fe)

103-R.* (German.) **Protection Against Corrosion During Naval Transport in Tropical Climates.** Hermann Determann. *Werkstoffe und Korrosion,* v. 8, Nov. 1957, p. 689-694.

Special observations were made during trial runs on steel products. Insufficient amounts of silica gel as drying medium may result in slight to severe corrosion depending on tightness of package. Bacteria favor corrosion and bananas can b r e e d bacteria. Anticorrosive greases and wax help. Vapor phase inhibitor is a good anticorrosive. 7 ref. (R3s, R10)

104-R.* (German.) **Corrosion of Metal Surfaces in Tropical Climates.** O. Marsch. *Werkstoffe und Korrosion,* v. 8, Nov. 1957, p. 688.

Tropical conditions are simulated by testing products at 40° C. and 90% relative humidity. Products made of nonferrous metals or with varnished surfaces are preferred. Electric equipment with bright surfaces must be electroplated with Cu, Ni, Zn, Au or Ag. Sweating of insulating materials causes corrosion. (R3s)

105-R.* **Galvanic Corrosion of Aluminum-Steel and Aluminum-Lead Couples.** M. J. Pryor. *Corrosion,* v. 14, Jan. 1958, p. 1t.

The galvanic current and the corrosion rate of the Al are proportional to the area of the steel cathode and are independent of the area of the Al anode. Factors increasing the access of oxygen to the cathode surface, such as stirring and aeration, increase the galvanic corrosion rate proportionately. (R1a; Al, ST, Pb)

106-R.* **Oxidation of Molybdenum.** E. S. Jones, J. F. Mosher, Rudolph Speiser and J. W. Spretnak. *Corrosion,* v. 14, Jan. 1958, p. 2t-8t.

Rate of evaporation of MoO_3 and the mechanism of Mo oxidation were determined. After an initial parabolic dependence of weight change upon time the rate of oxidation became linear. The outer MoO_3 layer is nonprotective so that the rate of oxidation of the suboxide to the trioxide at the suboxide-trioxide interface is equal to the rate of diffusion of oxygen through the suboxide film to the metal-suboxide interface. 29 ref. (R1h; Mo)

107-R.* **Effect of No, HNO_2 and HNO_3 on Corrosion of Stainless Steel by H_2SO_4.** W. P. McKinnell, Jr., L. F. Lockwood, R. Speiser, F. H. Beck and M. G. Fontana. *Corrosion,* v. 14, Jan. 1958, p. 9t-12t.

Specimens of Type 302 stainless steel, activated by abrading on 240-grit emery cloth and exposed to 10% H_2SO_4 solutions, were passivated by bubbling nitric oxide through the solution. Bubbling oxygen through the solution did not passivate abraded specimens. Abraded specimens exposed to an atmosphere of nitric oxide before immersion in nitric oxide-free H_2SO_4 remained active. 7 ref. (R6g, R10c; SS)

108-R.* **Kinetic Study of Acid Corrosion of Cadmium.** Henry Weaver, Jr., and Cecil C. Lynch. *Corrosion,* v. 14, Jan. 1958, p. 13t-14t.

Kinetics of the reaction of dilute hydrochloric acid with Cd metal, molded, electroplated on brass, and dipped on brass, investigated by calibrated conductance measurements. The effect of annealing molded Cd samples was to reduce the corrosion rate. The reaction rates at three acid concentrations and at three temperatures were determined. 8 ref. (R6, 2-64; Cd)

109-R.* Compilation and Correlation of High Temperature Catalytic Reformer Corrosion Data. G. Sorell. *Corrosion,* v. 14, Jan. 1958, p. 15t-26t.

Corrosion is attributed to small quantities of hydrogen sulphide present in the hot hydrogen-rich gas mixtures. The principal variables affecting the rate of attack are temperature and hydrogen sulphide concentration. Other factors, such as pressure, hydrogen content, time to exposure, cycling conditions and scale properties, discussed in relation to their effect on corrosion. 22 ref. (R7a)

110-R.* High-Temperature Hydrogen Sulfide Corrosion of Stainless Steels. E. B. Backensto, R. E. Drew, J. E. Prior and J. W. Sjoberg. *Corrosion,* v. 14, Jan. 1958, p. 27t-31t.

Only the austenitic steels offer satisfactory resistance to this type of attack under a wide range of conditions in the petroleum industry. Investigation covered the possible application of the new manganese-modified stainless steels; the effect of heat treatment on corrosion rate; comparison of corrosion rates of wrought, welded and cast stainless steel; tests on stress-corrosion cracking. 5 ref. (R6, R1d; SS)

111-R.* Breakaway Oxidation of Zirconium-Tin Alloys. Earl A. Gulbransen and Kenneth F. Andrew. *Corrosion,* v. 14, Jan. 1958, p. 32t.

A breakaway oxidation reaction is found for Zr-Sn alloys similar to the breakaway corrosion reaction found for steam reactions. As oxidation is a simple reaction to study, the basic breakaway phenomena may be elucidated. Data show the breakaway oxidation of Zircaloy II from 600 to 800° C. 9 ref. (R1h; Zr, *Sn*)

112-R.* Theoretical Aspects of Corrosion in Low Water Producing Sweet Oil Wells. *Corrosion,* v. 14, Jan. 1958, p. 33t-35t.

Principal corrosive agents are hydrolytic products of inorganic salts. These salts may be deposited on metal either in the form of a thin layer or as a consolidated scale. In addition to hydrolysis of the salts, electrochemical cells are set up between the metal and the various scale constituents and thus add to the corrosion. Physical appearance of the scale and changes in physical conditions were found to affect the corrosion rate. (R6j)

113-R.* Fuel Ash Attack on Aluminum Coated Stainless Steel. J. E. Srawley. *Corrosion,* v. 14, Jan. 1958, p. 36t-38t.

Laboratory investigation of the resistance of hot dip Al coated Type 310 stainless steel to attack by residual oil ash constituents. The coated specimens did not exhibit better resistance than the uncoated steel, nor did prior heat treatment of the coated specimens have an appreciable effect. Results of a boiler test were in agreement with the laboratory finding. 7 ref. (R7d; SS, *Al,* 8-65)

114-R.* Cavity Formation in Iron Oxide. D. W. Juenker, R. A. Meussner and C. E. Birchenall. *Corrosion,* v. 14, Jan. 1958, p. 39t-46t.

Study of the deep oxidation of Fe at high temperatures and in an oxygen atmosphere. Large cavities are always found in specimens whose total oxygen content has been brought to that of FeO. The scale thickness of such specimens, along with other evidence, implies that FeO is plastic in the temperature range in which it is stable, while one or both of the higher oxides is relatively rigid. 8 ref. (R1h; Fe)

115-R.* Corrosion and Metal Transport in Fused Sodium Hydroxide. Pt. 3. Formation of Composite Scales on Inconel. G. Pedro Smith, Mark E. Steidlitz and Eugene E. Hoffman. *Corrosion,* v. 14, Jan. 1958, p. 47t-52t.

Inconel was exposed to fused sodium hydroxide at temperatures of 450 to 815° C. and times up to 400 hr. The observed reaction was shown to consist in the selective leaching of Fe and Cr from their solid solution with Ni. The reaction product, a mixture of oxides and sodium oxysalts, was found to grow in a network of channels which, starting from the metal surface, penetrated into the bulk Inconel. 7 ref. (R6j, R2q, R2a; Ni)

116-R.* Structural Features of Corrosion of Aluminum Alloys in Water at 300° C. Kurt M. Carlsen. *Corrosion,* v. 14, Jan. 1958, p. 53t-56t.

A number of Al alloy specimens were immersed in distilled water heated to 300° C. and a study made of the structural features of corrosion. Samples were of the following general alloy types; Al-Ni, Al-Fe, Al-Ni-Fe, Al-Cu and Al-Ni-Si alloys. After exposure samples were examined by metallographic microscope. (R4a, 1-66; Al)

117-R.* Organic Corrosion Inhibitors for Iron. Robert Jenny. *Industrial Finishing (London),* v. 9, Oct. 1957, p. 872-876, 890.

Inhibition of acid corrosion of Fe by mercaptans. Study of the nature of reactions occurring between mercaptans and Fe in acid solutions; nature of organic corrosion inhibition. (R10b; Fe)

118-R.* Nature of Pitting Attack on Cast Iron Propellers and Preliminary Experiments on Its Prevention by Cathodic Protection. R. I. Higgins. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 129-143.

The incidence, form and distribution of this attack appear to be dependent, to some extent, on the tip speed of the propeller. Nature of pitting; evidence shows that the metal is removed by a corrosion process rather than by an erosion process. Attack can be prevented by cathodic protection by means of a sacrificial magensium anode which is attached to the propeller rather than the hull of the ship.
(R2j, R10d, T22h)

119-R.* Material Transport in Sodium Systems. Fred G. Haag. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 43-50.

Results of comprehensive investigation into cause and magnitude of material transport in flowing Na systems by use of radioactive tracer techniques. Transfer tests include capsule experiment and lube test with AISI 347 stainless steels as structural material. Effects of oxygen concentration, temperature gradient, time, velocity, reactor conditions and presence of migration inhibiting elements on the rate of transfer of radioactive isotopes, from stainless steel activated by exposure in reactor. 13 ref.
(R2a, 1-59; SS, *Na,* 14-60)

120-R.* Low-Cost Materials for Sodium Heat Transfer Systems. E. G. Brush and R. F. Koenig. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 59-65.

Results of laboratory scale tests with static and dynamic Na systems in which resistance of ferrite alloys to corrosive attack was investigated at temperatures up to 1000° F. Resistance of alloys with varying amounts of Cr to mass transfer attack by oxygen, decarburization and to diffusion bonding. 13 ref.
(R6m, R2a, T11, 17-57; *Cr, Na,* 14-60)

121-R.* Static and Dynamic Corrosion and Mass Transfer in Liquid Metal Systems. Leo F. Epstein. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 67-81.

Mechanism and rate-determining steps of static and dynamic corrosion and mass transfer where corrosion process is due essentially to solution of metal in the liquid. 51 ref. (R2a, T11; 14-60)

122-R. Corrosion Research in Progress. Effect of Dissolved Oxygen on Corrosion and on Cathodic Protection Requirements. G. A. Marsh and E. Schaschl. *Corrosion,* v. 13, Nov. 1957, p. 695t.

(R1, R10d)

123-R. Factors Other Than Mineral Content Which Influence the Corrosiveness of Cooling Water. E. H. Hurst. *Corrosion,* v. 13, Nov. 1957, p. 696t-700t.

8 ref. (R4c)

124-R. Non-Chemical Factors Affecting Inhibitor Selection and Performance in Air Conditioning Cooling Waters. Sidney Sussman. *Corrosion,* v. 13, Nov. 1957, p. 701t-710t.

5 ref. (R4a, R10b)

125-R. Inhibiting a Cooling Water Tower System. F. L. Whitney, Jr. *Corrosion,* v. 13, Nov. 1957, p. 711t-718t.

19 ref. (R10b, W10h)

126-R. Some Experiences With Sodium Silicate as a Corrosion Inhibitor in Industrial Cooling Waters. J. W. Wood, J. S. Beecher and P. S. Laurence. *Corrosion,* v. 13, Nov. 1957, p. 719t-724t.

10 ref. (R10b, R4)

127-R.* Thermochemical Study of Some Additives to Reduce Residual Fuel Ash Corrosion. W. E. Young and A. E. Hershey. *Corrosion,* v. 13, Nov. 1957, p. 725t-732t.

A theoretical study on V and Na, the two most objectionable elements occurring in residual fuel ash, and additives which might inhibit corrosion. Freezing point curves and thermal properties were calculated for mixtures of oxide or sulphate containing Mg, Al or Ca as well as Na or V compounds. Dissociation calculations were made and the following conclusions reached: Al compounds were most satisfactory of

metallic additions because aluminum sulphate dissociates to corrosion-reducing oxide at temperatures only slightly above prevailing turbine inlet temperatures. 12 ref.
(R7d, R10b)

128-R.* Corrosion and Adsorption Studies Using Sulfonate Inhibitors. A. H. Roebuck, P. L. Gant, O. L. Riggs and J. D. Sudbury. *Corrosion,* v. 13, Nov. 1957, p. 733t-738t.

Study of adsorption and desorption of sodium and amine salts of sulphonic acids by radioactive tracers. Corrosion inhibiting properties of these salts in hydrogen sulphide or carbon dioxide environment for steel specimens. Effect of concentration, solubility, molecular weight and extent of neutralization of sulphonic acid on corrosion inhibition. Mechanism of protective action by sulphonate inhibitors. 15 ref. (R10b, 1-59; ST)

129-R. Status of Downhole Corrosion in the East Texas Field. *Corrosion,* v. 13, Nov. 1957, p. 743t-746t.

Results of questionnaire survey. Extent, treating schedule and types of chemical inhibitors used and success in combatting oil well corrosion. (R2, R10b, T28)

130-R. Water Dependent Sweet Oil Well Corrosion Laboratory Studies. *Corrosion,* v. 13, Nov. 1957, p. 747t-749t.

Data reported on correlation between hole bottom pH and tubing life under various production conditions. (R4, T28p)

131-R.* Evaluation of Inhibitors for Corrosion Prevention in Engine Cooling System. Leonard C. Rowe. *Corrosion,* v. 13, Nov. 1957, p. 750t-756t.

Rotating specimen tests used to evaluate effectiveness of inhibitors such as sodium borate, sodium nitride, sodium benzoate, potassium dichromate, soluble oil, sodium mercaptobenzothiazole with various test media including tap water, ethyleneglycol-water mixtures with and without additional corrosive constituents for specimens of steel, Cu, brass, Al, cast iron and solder. Data on one-year room temperature static tests on 13 galvanic couples. 9 ref.
(R10b; ST, Cu, Al, CI)

132-R.* Corrosion by Acetic Acid. *Corrosion,* v. 13, Nov. 1957, p. 757t-766t.

Summary of data and experience with use of various materials for storage and handling of refined glacial as well as dilute acetic acid. Common corrosion problems; laboratory and field corrosion test results; common types of failure; Al alloys, austenitic stainless steels and Cu alloys; their limitations and use; importance of minor contaminants and oxidizing or reducing nature of environment in choosing proper materials. (R7b; Al, SS, Cu)

133-R. Current Requirement for Cathodic Protection of Oil Well Casing. E. W. Haycock. *Corrosion,* v. 13, Nov. 1957, p. 767t-774t.

(R10d, T28)

134-R. Fundamentals of Electrode Processes in Corrosion. Milton Stern. *Corrosion,* v. 13, Nov. 1957, p. 775t-782t.

Effect of pH, oxygen concentration, environment, velocity, iron composition, heat treatment and galvanic coupling on corrosion rate explained in terms of the fundamental principles of activation, polarization and concentration polarization. 14 ref. (R1a)

135-R. Acetic Acid Salt Spray Test. J. H. Hooper. *Electroplating and Metal Finishing,* v. 10, Dec. 1957, p. 403-408.

A comparison with other methods of simulating service breakdown of protected metal surfaces. 8 ref. (R11j)

136-R.* Rustproofing Oils for Processing. Eugene R. Slaby. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 103.

Present-day slushing oils when correctly applied to sheet or strip steel can effectively safeguard surfaces against rust and corrosion; rust preventives permit shipment of coils without customary wrappings. (R10f; ST, NM-h, 4-53)

137-R.* Corrosion of Tinplate by Victoria Plum Syrup. F. W. Salt and J. G. N. Thomas. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 36-45.

The syrup contains both inhibitors and accelerators of corrosion. Stannous tin inhibits the corrosion appreciably, but stannic tin slightly accelerates it. A number of possible organic inhibitors have been investigated in the plum syrup and two, caprylic and caproic acids, were found to give appreciable inhibition in the presence of 25 ppm. stannous tin. Caprylic acid alone in the plum syrup greatly increases the steel corrosion rate. 16 ref.
(R7n, R10b; Sn, 8-62)

138-R. A Systematic Study of Corrosion in Magnesium Printing Plates.

F. W. MacKenzie. *Process*, v. 64, Nov. 1957, p. 422-423.
(R6g, T9n; Mg)

139-R. Effect of Corrosion Preventives and Initial Barrier Wrappers on Preservation of Anti-Friction Bearings. L. H. Wagner. Rock Island Arsenal Laboratory. *U. S. Office of Technical Services*, PB 131262, May 1956, 51 p. $1.50.
(R3, R10e, T7d; ST, Cu)

140-R. (English.) **Review of Low-Temperature Corrosion by Combustion Gases in Oil Burning Plant.** G. F. J. Murray. *Schweizer-Archiv*, v. 23, Sept. 1957, p. 280-292.
Experiments on the addition of alkaline additives to the fuel oil and into the flue gas stream. 23 ref. (R7k, R10c, T26q)

141-R. (French.) **The Oxidation of Billets.** J. Moreau and M. Cagnet. *Institut de Recherche de la Siderurgie*, Series A, no. 157, p. 1-23.
Study made by micrography, X-ray and electronic microprobe (Castaing). Structure and composition of oxides; contamination of the steel; kinetics of oxidation; influence of the temperature and the atmosphere of the furnace on the formation of oxides; reproduction of the oxidation in laboratory. (R1h, R2q; ST, 4-52)

142-R.* (German.) **Some Basic Problems of the Formation and Adherence of Scale on Iron.** H. Engell and F. Wever. *Acta Metallurgica*, v. 5, Dec. 1957, p. 695-702.
Some kind of Kirkendall effect occurs due to preferential diffusion of either metal or oxygen in an oxide layer during the scaling of metals. If the metal diffusion predominates, voids are formed between scale and metal, or the oxide layer is porous. Both these phenomena influence the mechanical adherence of scale on the metal and the kinetics of oxidation. In the case of preferential diffusion of oxygen there will be a compressed region at the boundary metal to oxide (if the oxide has a larger specific volume than the metal) which facilitates the peeling-off of the scale. 6 ref.
(R2q, R1h; Fe)

143-R. (German.) **Corrosion Prevention in Petroleum Refining.** Werner Wisfeld. *Erdöl und Kohle*, v. 10, July 1957, p. 449-450.
(R10, T29n)

144-R. (German.) **Oxide Patterns Appearing on the Surface of Molten Cast Iron.** Osamu Madono. *Giesserei*, v. 44, Nov. 21, 1957, p. 714-718.
(R1h, CI, 14-60)

145-R. (German.) **Weldable Aluminum-Magnesium Alloys.** P. Brenner. *Schweissen und Schneiden*, v. 9, Nov. 1957, p. 483-492.
Corrosion resistance of welded and unwelded 4% Mg and 5% Mg sheet to atmosphere and sea water. Stress-corrosion sensitivity. 12 ref.
(R3, R4b, K9; Al, *Mg*, 4-53)

146-R. (German.) **Remarks on Corrosion of Steam Boiler Heater Surfaces.** Alberts Upmalis. *Svensk Papperstidning*, v. 60, Oct. 15, 1957, p. 699-705.
Protective methods based on research and experience are: absorption of sulphur trioxide, neutralization of sulphuric acid, use of resistant materials and proper management of the boiler.
(R4d, R10, T26q)

147-R. (Swedish.) **Corrosion in Steam Boilers.** Torsten Widell. *Tekniska Foreningen i Finlands Forhandlingar*. v. 77, Sept. 1957, p. 209-218.
Corrosion due to composition of modern heavy oils and their deposits in the air-preheater. The formation of sulphuric acid and sulphur trioxide. Analysis of the corrosive action at low and high temperatures. Corrosion-preventing oil additives. 23 ref.
(R6g, R7e, R7k, B10b, T26q)

148-R.* **Corrosion of Stainless Steels in Boiling Acids and Its Suppression by Ferric Salts.** Michael A. Streicher. *Corrosion*, v. 14, Feb. 1958, p. 59t-70t.
Influence of various alloying elements in stainless steels on the course of corrosive attack by eight acids. Factors in the environment (acid concentration, corrosion products and oxygen) which determine the course of corrosion. The acids used were oxalic, formic, acetic, hydroxy-acetic, phosphoric, sulphuric, sulphamic and sodium bisulphate and the stainless steels included straight Cr (AISI 400 series), 18-8 Cr-Ni (AISI 300 series) and some Cr-Mn-Ni steels. 23 ref.
(R6g, R10a; SS)

149-R. Inter Society Corrosion Committee Glossary of Corrosion Terms. *Corrosion*, v. 14, Feb. 1958, p. 71t-72t.
Definitions for 53 commonly used terms. For certain terms, supplementary wording is included to make the definition more easily understood. (R general, 11-67)

150-R.* Corrosion of Metals in Tropical Environments. Pt. 1. B. W. Forgeson, C. R. Southwell, A. L. Alexander, H. W. Mundt and L. J. Thompson. *Corrosion,* v. 14, Feb. 1958, p. 73t-81t.

Corrosion rates and characteristics of 50 different metals and alloys exposed to five natural tropical environments for various periods. Corrosion rate of Al, Pb, Ni, Zn, Cu and structural steel. Corrosion data are obtained from weight loss and pitting measurements, visual inspection and physical property studies. 6 ref.
(R3s, 3-67; Al, Pb, Ni, Zn, Cu, ST)

151-R.* Effect of Inhibitors in Fuming Nitric Acid on Corrosion and Oxidation. Tin Boo Yee. *Corrosion,* v. 14, Feb. 1958, p. 82t-84t.

Procedure by which an inhibitor for fuming nitric acid can be selected to give good inhibition to corrosion and, at the same time, increase the oxidizing power of the acid. The inhibitors used in this study are KI, KIO_3, I_2, I_2O_5, CaF_2, HF, NH_4F, and Na_3AlF_6.
(R10b, R6g)

152-R. Corrosion of Lead Sheath in Manhole Water. *Corrosion,* v. 14, Feb. 1958, p. 85t-87t.

Tests were made in 45 selected manholes in Tokyo by attaching Pb coupons to cable sheaths in the manholes and submerging coupons in the manhole water. Corrosion losses by weight measured at 100 and 240 days were proportional to potential difference between cable and ground. Pitting was found where potential to ground was more than 100 mV. No relationship between weight losses and water composition could be determined because of varying potentials to ground. (R4a, R1j; Pb)

153-R.* Electrochemical Deterioration of Graphite and High-Silicon Iron Anodes in Sodium Chloride Electrolytes. S. Tudor, W. L. Miller, A. Ticker and H. S. Preiser. *Corrosion,* v. 14, Feb. 1958, p. 93t-99t.

Influences of specific resistivity of the electrolyte and of anodic current density on electrochemical deterioration. Deterioration of graphite increases with increasing specific resistivity or decreasing NaCl concentration of the electrolyte. The effect of impregnation of graphite anodes on the electrochemical deterioration rates and the variation of this effect with electrolyte specific resistivity are indicated. 9 ref. (R1a, W3h; Fe, *Si,* NM-k36)

154-R.* Corrosion in Amine Gas Treating Solutions. Frances S. Lang and J. F. Mason, Jr. *Corrosion,* v. 14, Feb. 1958, p. 105t-108t.

Laboratory corrosion tests on steel, stainless steels, Monel, and Ni in amine solution saturated with carbon dioxide and hydrogen sulphide. Effects of temperature, pressure and amine concentration and the presence of sludge. Type 304 and 316 stainless steel gave consistently low corrosion rates under all conditions. Monel was satisfactory when carbon dioxide or hydrogen sulphide were present singularly in the amine but mixtures of the gases were damaging. 9 ref.
(R7; ST, SS, Ni)

155-R.* Variables Influencing Corrosivity of Oil and Gas Wells. *Corrosion,* v. 14, Feb. 1958, p. 108-116, 120.

Well variables include temperature, pressure, carbon dioxide content, organic acid content, velocity. An example of poor correlation among these factors and accepted theories of well corrosion. Influence of steel inhomogeneities and problems involving human error.
(R general, T28; ST)

156-R. Rusting and Its Cost to Farming. E. E. White. *Corrosion Technology,* v. 4, Dec. 1957, p. 413-416.

(R general, T3)

157-R.* Corrosion Problems With Fuming Nitric Acid Rocket Fuel Requires New Tests. M. G. Fontana. *Corrosion Technology,* v. 4, Dec. 1957, p. 423-424.

Corrosion fatigue of materials in fuming nitric acid; cathodic protection tests and stress-corrosion tests of certain types of stainless steel; polarization studies of Al and stainless steel; studies designed to show concentration cell corrosion, including corrosion by sludged fuming nitric acid. (R6g, R11s; SS)

158-R. (French.) **Cathodic Protection of Pipes by Drawing Off Current.** G. Fauvel. *Corrosion et Anticorrosion,* v. 5, no. 11, p. 331-338.

The effectiveness of a cathodic protection system depends upon length of pipe to be protected and size of the ground terminal. An example of calculation of cost of protection by kilometer of pipe is given. The size of the ground terminal is calculated as a function of intensity of the protecting current and ground resistivity. The rectifiers used are chosen with re-

spect to economic conditions and physical properties of the protected pipe. (R10d, 5-60)

159-R. (French.) **Thickness Decrease in Steel Sheets and Pipes Caused by Corrosion.** M. G. Piron. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 339-347.

Several nondestructive processes are reviewed, including photography, television, acoustic methods, radiography and electric methods. The magnetic method is emphasized. (R11a, S14, 4-53, 4-60; ST)

160-R. (French.) **Protection of Materials for Propellant Rocket Motors Working With Unstable Combustion.** B. Langenecker. *Métaux, Corrosion, Industrie,* no. 385, Sept. 1957, p. 343-351.

Gaseous bubbles tear small crystals off the metal surface by condensation. The catalytic activity of the exposed surfaces is such that the flash point of the fuel is lowered and combustion accelerated. Then, metallic grains are burnt or melted. The only preventive is the increase of combustion stability. 24 ref. (R7d, T2p)

161-R. (German.) **Structure of Scale and Strength of Adhesion to the Surface of Carbon Steel Plates.** Hans-Jurgen Engell and Friedrich-Karl Peters. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 567-574.

Both the final hot rolling temperature and the killing of steel with Si or with Si and Al influence the formation and the strength of adhesion of scale. The structure and composition of scale was investigated and the formation of an intermediate layer of high silicate contents in killed steel was proven. 8 ref. (R2q, M28; CN, 4-53)

162-R. (German.) **Rust Inhibitors.** H. Spindler. *Fertigungstechnik,* v. 7, Sept. 1957, p. 429-430.

Determination of exact amount of the rust inhibitor required is main obstacle in application. Its usability must be determined in practice. 10 ref. (R10b; CI, ST)

163-R.* (Italian.) **On Some Inhibitors of Aluminum Corrosion. Pt. 2. Effect of Tannic Acid on 99% Al in 1 *N* Hydrochloric Acid.** G. de Angelis and V. Carunchio. *Metallurgia Italiana,* v. 49, Nov. 1957, p. 783-792.

On basis of loss of weight and reaction potential of Al electrodes in a galvanic cell, and of electrochemical behavior and polarization curves of an Al-Fe couple, it is concluded that dissolution of Al in 1 *N* HCL is electrochemical in nature and under mixed control; that tannic acid inhibits corrosion of 99% Al by acting on anodic and cathodic polarizations; that action of the acid is presumably due to its adsorption over entire surface (i.e., on both anodic and cathodic areas). 19 ref. (R10b; R6g; Al, Fe)

164-R.* (Russian.) **Corrosion Resistance of Metals Used in Hydroturbine Parts.** M. G. Timerbulatov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 12-18.

Seven grades of steels and two grades of high-strength cast iron evaluated for weight losses due to corrosion in water. Addition of phosphorus to carbon steel containing 1.32% Cu was detrimental. High-strength cast iron was worse than carbon steel containing Cu. Negligible losses were observed with steel containing 12.33% Cr. Details of best heat treatment of carbon steel containing Cu in respect to best anticorrosive properties. 5 ref. (R4, 2-60; ST, CI)

165-R. Corrosion in Nuclear Power Production. B. L. Harbourne. *Corrosion Prevention and Control,* v. 5, Jan. 1958, p. 43-48.

Factors influencing the selection of canning materials. Role of the coolant in the deterioration of the fuel element can has been considered for three reactor systems. 11 ref. (R general, T11g)

166-R. Causes and Prevention of Corrosion in Tar Stills. D. McNeil. *Corrosion Technology,* v. 4, Nov. 1957, p. 385-389.

(R7c, R10; ST)

167-R. Corrosion Investigation by Electrical Measurements. D. Hendrickson. *Corrosion Technology,* v. 4, Nov. 1957, p. 390-393.

Application of soil surface potential method of survey to locating corroding areas and approximating current density of discharge for Mokelumne Aqueduct consisting of 81 miles of parallel bituminous coated and cement mortar coated pipes. (R8, 1-54; 4-60)

168-R. Corrosion Resistance of Cobalt. R. S. Young. *Corrosion Technology,* v. 4, Nov. 1957, p. 396-397, 403.

12 ref. (R general; Co)

169-R.* Investigations Into Stress-Corrosion Cracking in Welded Gas

Plant. *Gas Journal;* v. 292, Nov. 27, 1957, p. 464-470.

Stress-relieving of welded components by Linde low-temperature process and control of liquor compositions are effective in preventing cracking. (R1d, J1a, 9-72)

170-R.* Corrosion Studies With Nickel-Chromium Plate. H. Brown, M. Weinberg and R. J. Clauss. *Plating,* v. 45, Feb. 1958, p. 144-150.

Best improvement in the outdoor corrosion resistance of Cr-plated fine-grained bright Ni deposits were obtained by operating the bright Cr plating bath at 131° F. and at ratios of chromic acid anhydride to sulphate of 150:1 to 200:1, and with the use of at least 0.03 mil of bright Cr plate, preferably 0.05 to 0.08 mil. 6 ref. (R3, L17b; *Ni, Cr*)

171-R.* Salt Spray Testing of Tin-plated Copper. Pt. 1. Corrosion Measurement by Chemical Porosity Test. Martin S. Frant. *Plating,* v. 45, Feb, 1958, p. 157-160.

Difference in porosity (or more precisely, copper surface available to the reagent) before and after exposure to salt-spray is used as a measure of corrosion. Correlation of visual results with the porosity test; use in determining corrosion rates, in comparing various types of salt spray, in determining effect of plating thickness on corrosion resistance, in comparing different plating solutions, and effect of reflowing (melting) the Sn coating. 13 ref. (R11j, L17c; Sn, 8-62)

172-R.* (German.) **Protective Action Anodized Layers on Aluminum and Methods for Testing.** W. Wiederholt. *Aluminium,* v. 34, Jan. 1958, p. 21-29.

Layer thicknesses can be determined microscopically, gravimetrically and by measurement of breakdown potentials and by special instruments; by determination of oxide layer density and effectiveness of sealing. Results of tests can be checked by corrosion tests. 9 ref. (R11, S14, 1-54; Al, 8-73)

173-R. (German.) **Resistance of Aluminum to Normal Organic Solvents.** K. Broockmann. *Aluminium,* v. 34, Jan. 1958, p. 30-35.

Addition of water and ketone can prevent corrosion by common organic solvents. 14 ref. (R7, R10d; Al)

174-R. (Russian.) **Formation of Scale on Steel Castings.** B. B. Gulyaev and Yu. F. Borovskii. *Liteinoe Proizvodstvo,* June 1957, p. 5-7.

Mechanism of scale formation. (R2q, 5-60; ST)

175-R. (Russian.) **Experiments With Gaseous Corrosion Under Stress.** M. Ya. Lvovskii and G. E. Moskalenko. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1374-1376.

Corrosion of sheet metal at high temperatures. (R1d, R6, 2-62, 4-53)

176-R. (Swedish.) **Investigation of Corrosion Risks in Clay.** Allan Bergfelt. *Statens Nemd for Byggnadsforskning, Transactions,* no. 28, 1957, 63 p.

Electrochemical processes involved in corrosion of metals in soil. Quantitative estimates of amount of corrosion. Formula for loss of weight as a function of the resistivity and electromotive force. Factors influencing corrosion of metals in soil. 26 ref. (R8; CI, ST)

177-R. Oxidation of Carbon Steels. S. S. Pani, K. C. Som and G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 195-199.

Rate of oxidation at different temperatures on vacuum diffusion of Ni and Cr. (R1h, L15, 1-73; CN-b, *Ni, Cr*)

178-R. Effects of Irradiation on Corrosion Resistance of Some High Uranium Alloys. Sherman Greenberg and Joseph E. Draley. *Nuclear Science and Engineering,* v. 3, Jan. 1958, p. 19-28.

Report of corrosion tests on U-base alloys in high-temperature water. 6 ref. (R4a, 2-67; U)

179-R. (German.) **Corrosion and Corrosion Protection.** Wilhelm Wiederholt. *Erdöl und Kohle,* v. 10, Nov. 1957, p. 773-777.

The most important manifestations, causes and process of corrosion; methods of protection. 5 ref. (R general)

180-R. (German.) **Corrosion Prevention in Turkey Using Colarit-Flame-Spraying of Coal Tar Pitch.** Harald Stern. *Werkstoffe und Korrosion,* v. 8, Dec. 1957, p. 736-738.

(R10f, L26a)

181-R. (German.) **Inhibitive Action of Sodium Benzoate on Atmospheric Corrosion of Mild Steel.** O. Sarc-Lahodny. *Werkstoffe und Korrosion,* v. 8, Dec. 1957, p. 738-742.

6 ref. (R3, R10b; CN)

182-R. (German.) **Modern Detergents and Hot Galvanization.** Heinz Bablik and M. Belohlavy. *Werkstoffe und Korrosion,* v. 8, Dec. 1957, p. 742-746.

Detergents containing polyphosphates attack hot galvanized surfaces. (R6j, *Zn,* 8-65)

183-R. (German.) **Corrosion Testing of Chemically Resistant Steels in Liquids.** Herbert Zitter. *Werkstoffe und Korrosion,* v. 8, Dec. 1957, p. 746-760.

Series of experiments show how different factors influence results of tests on Cr-Ni steel in inorganic acids. 22 ref. (R11, R6g; *Cr, Ni,* SS)

184-R. Erosion and Corrosion of Turbine Materials in Wet Oxygenated Steam. H. A. Cataldi, C. F. Cheng and V. S. Musick. *American Society of Mechanical Engineers,* Paper no. 57-A—134, Aug. 1957, 12 p.

Laboratory tests evaluating resistance of various materials for turbines and related components to erosion (impact, washing, wiredrawing) and corrosion (weight loss, pitting depths, crevice and galvanic attack). 12 ref. (R1c, R4d, R11, W11k)

185-R. Ferrous Hydroxide Solubility, Thermal Decomposition and Role in the Corrosion of Iron. P. D. Miller, J. J. Ward, O. M. Stewart and R. S. Peoples. *American Society of Mechanical Engineers,* Paper no. 57-A—184, Dec. 1957, 13 p.

Decomposition of pure ferrous hydroxide between 250 and 550° F. The major decomposition products are hydrogen and magnetite; minor constituents are alpha iron and Fe_2O_3. The rate of decomposition is such that it is concluded that the decomposition of ferrous hydroxide is not the rate-controlling step in the iron-water corrosion reaction at temperatures above 250° F. 6 ref. (R4d; Fe)

186-R. Sulfuric-Acid Corrosion in Oil-Fired Boilers and Studies on Sulfur-Trioxide Formation. Donald R. Anderson and Frank P. Manik. *American Society of Mechanical Engineers,* Paper no. 57-A—199, Dec. 1957, 12 p.

Sulphuric-acid corrosion in air heaters and economizers of residual oil-fired boilers. Factors controlling oxidation of sulphur dioxide to sulphur trioxide during combustion process of residual fuels. 35 ref. (R6g, R7k; ST)

187-R. Mass Transfer. A. K. Covington. *Atomics and Nuclear Energy,* v. 9, Jan. 1958, p. 10-11, 34.

9 ref. (R2a, T11)

188-R. Corrosion of Iron and Steel in the Salt-Crust Treatment of Mine Roads and Its Suppression by Inhibiting Agents. A. L. Godbert and M. C. White. *British Safety in Mines, Research,* Report 143, Oct. 1957, 24 p.

The salt-crust process as means of preventing coal-dust explosions by immobilizing coal dust deposited on mine roads. (R6, R10b; Fe, ST)

189-R. Study of the Corrosion of Vaporizing-Liquid Type Fire Extinguishers. J. A. Bono. *Underwriters' Laboratories, Inc., Bulletin of Research,* no. 50, Dec. 1957, 54 p.

Principal factor in corrosion of pump-type vaporizing-liquid fire extinguishers was found to be the composition of the liquid. Presence of 0.80% carbon disulphide, and use of trichloroethylene as freezing point depressant found to be desirable characteristic of the liquid. Absence of carbon disulphide rendered extinguishers very susceptible to corrosion. (R6p)

190-R. Corrosion of Aluminum by Alkaline Sequestering Solutions. H. W. McCune. *Industrial and Engineering Chemistry,* v. 50, Jan. 10, 1958, p. 67-70.

Corrosion by alkaline and alkaline sequestering solutions, and by solutions of sodium triphosphate and tetra-acetate. 18 ref. (R6j; Al)

191-R.* Acceleration Corrosion Testing of Chromium-Plated Articles—Sulphur Dioxide Test. J. Edwards. *Institute of Metal Finishing, Bulletin,* v. 7, Winter 1957-1958, p. 55-78.

Accelerated corrosion test employing a humid atmosphere containing sulphur dioxide. Permissible variations in sulphur dioxide concentration, relative humidity and temperature; required conditions can be maintained by simple methods; 24 hr. is a sufficiently long test period for most purposes. The corrosion pattern developed closely resembles that produced by outdoor exposure. The test is suitable for a variety of coatings on steel, and may also be effective on other basis metals. 7 ref. (R11k; ST, 8-62, *Cr*)

192-R.* Potentiostat Technique for Studying the Acid Resistance of Alloy Steels. C. Edeleanu. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 122-132.

It is possible to determine a "potential-current" (P-C) diagram for each steel and from these it is possible to predict under what conditions the steel will have adequate resistance. The potential-corrosion-rate curve can be regarded as an anodic polarization curve by substituting the equivalent current for the corrosion rate, and from it, it is possible to determine the rate at which the anodic (electron-producing) reaction tends to occur at any given potential. 14 ref. (R11a, R6g; AY)

193-R. Corrosion Resistance of Nickel Alloys in Molten Sodium Hydroxide. H. B. Probst, C. E. May and Howard T. McHenry. *National Advisory Committee for Aeronautics,* Technical Note 4157, Jan. 1958, 26 p.

12 ref. (R6j; Ni)

194-R. Ultrasonics in the Oil Industry. Corrosion Damage Detection. F. M. Savage. *Petroleum,* v. 21, Feb. 1958, p. 53-54.

(R2, S14g)

195-R. Copper Ion Displacement Test for Screening Corrosion Inhibitors. William B. Hughes. *Petroleum Technology, Journal,* v. 10, Jan. 1958, p. 54-56.
(R10b)

196-R. Effect of Wire Metal on the Thermal Life of Enameled Magnet Wire. J. H. Thomas and J. F. Dexter. *Power Apparatus and Systems,* no. 33, Dec. 1957, p. 1009-1013.

(R2, T1, 5-61; Cu, 4-61)

197-R. (English.) **Corrosion Control.** Herbert H. Uhlig. *Teknisk-Vetenskaplig,* v. 28, no. 8, 1957, p. 351-354.

8 ref. (R1)

198-R. (Dutch.) **Corrosion and Corrosion Research.** P. J. Gellings. *Lastechniek,* v. 24, Jan. 1958, p. 1-5.

Examples of corrosion including some due to welding. 5 ref. (R1, R2; 7-51)

199-R. (Hungarian.) **Reasons for Blisters on Aluminum Plates.** Tibor Laar. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 185-193.

10 ref. (R2n, 9-71; Al, 4-53)

200-R. (Hungarian.) **Oxidation of Porous Sintered Steel Parts.** Pal Csokan. *Kohaszati Lapok,* v. 12, July 1957, p. 317-319.

Reduction of corrosion by oil impregnation. (R1h, R10f; 6-71, ST)

201-R. (Russian.) **Brass Corrosion in Alkaline Solution.** L. S. Zhuravlev and D. Ya. Kagan. *Electricheskie Tantsu,* v. 28, Dec. 1957, p. 26-28.

Experiments show that presence of oxygen intensifies corrosion of brass in alkaline solution; elimination of oxygen reduces corrosion to negligible factor. (R6j; Cu-n)

202-R.* Corrosion Resistance of Tin Alloy Electrodeposits. Frederick A. Lowenheim. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 42-46.

Advantages and limitations of using Sn and Sn alloys for corrosion prevention. Compositions and results of exposure tests on Sn-Zn, Sn-Cd, Sn-Pb, Sn-Ni and Sn-Cu alloys. Tin is good undercoat for Zn and Cd in marine environment and can be used for undercoat of both organic and metallic coatings. Although Sn-Zn alloy is not choice coating for protection of steel, it appears promising in contact with Al. Superiority of bronze over Cu as undercoat in Ni-Cr systems is shown. 35 ref.
(R3n, R3p, L17b, 2-60; *Sn*)

203-R. Materials for Corrosion Control. Frederick W. Fink. *Industrial and Engineering Chemistry,* v. 50, Jan. 10, 1958, p. 67-70.

Review of literature; new corrosion problems in nuclear energy field; potentials and limitations of Ti and Zr in corrosion control. 18 ref. (R-general, T11, 17-57; Ti, Zr)

204-R.* (French.) **Prevention of Corrosion and Scale Formation by Magnetic Treatment of Liquids.** Theo Vermeiren. *Cebelcor, Rapport Technique no. 54,* Sept. 1957, 16 p.

Design of permanent magnet devices used in this technique; causes of failure of such devices; chemical effects of magnetic treatment and control of efficacy; applications.
(R10a, 1-53, X11g)

205-R.* (French.) **Study of Physical Antiscaling Treatments.** J. Laureys and M. Pourbaix. *Cebelcor, Rapport Technique no. 56,* Sept. 1957, 36 p.

Laboratory installation for evaluation of efficacy of water treatment methods in the case of distilling equipment. Effectiveness of magnetic and electromagnetic treatments, mercury floats, and inoculation with sodium metaphosphate and sodium uranate. Influence of a prior trickling treatment on scale-forming effect of nontreated water and magnetically treated water. Physicochemical effects connected with conditions of efficacy of physi-

cal treatments. Effect of external factors on crystallization phenomena. Current research program of Cebelcor Commission on Antiscale Formation Processes. 9 ref. (R10a, R4, A9)

206-R.* (French.) **Lessons on Electrochemical Corrosion (Provisional Notes). Pt. 1.** M. Pourbaix. *Cebelcor, Rapport Technique no. 57,* Nov. 1957, 26 p.

Part of course (in three parts) given at School of Applied Sciences of University of Brussels. Basic principles governing phenomena of corrosion by aqueous solutions and application of principles to study of technical problems of corrosion and scaling. Economic and technical aspects of corrosion; scientific aspects such as complexity of phenomena, use of chemical and electrochemical thermodynamics. 6 ref. (R1, R6)

207-R.* (French.) **On Grading the Corrosion Resistance of Steels Under Stress in Saline Solutions Saturated With Hydrogen Sulphide.** Eugene Herzog. *Comptes Rendus,* v. 245, Dec. 16, 1957, p. 2280-2282.

A mild killed steel, a mild carbon steel, a semihard Mn-Mo steel, and a mild Cr-Mo-Al-V steel were subjected to cold working, then immersed in solution of sodium chloride and hydrogen sulphide, with tensile stresses being simultaneously applied. Conditions of normal service were simulated as closely as possible, and respective intervals of time before rupture were recorded. Appearance of cracks was influenced by percentage of hydrogen ions in solution, prior cold working, amount and distribution of stress. (R1d, R6j; ST)

208-R.* (French.) **Use of Radioactive Isotopes in the Study of Metallic Corrosion in Alkaline Media.** Helmy Makram. *Comptes Rendus,* v. 246, Jan. 6, 1958, p. 99-101.

Specimens of electrolytically pure Cu were irradiated by means of an atomic pile, then immersed in solutions of NaOHN, trigon, or P.Z. Passage of marked ions into solution was studied in function of time. (R11, 1-59; Cu-a)

209-R.* (French.) **On a Colloidal Interpretation of the Phenomena of Corrosion and Inhibition.** Jean Frasch. *Corrosion et Anti-Corrosion,* v. 6, Jan. 1958, p. 9-14.

Attempt to fit into electrochemical theory of corrosion and inhibition some of theories which have been advanced concerning colloidal nature of majority of products of corrosion. (R10b, 14-65)

210-R.* (French.) **Corrosion Phenomena in Tubular Condensers. Some Typical Examples, Correctives and Preventives.** A. J. Maurin. *Corrosion et Anti-Corrosion,* v. 6, Jan. 1958, p. 15-24.

Additional case histories; influence of microstructure of Cu alloys on corrosion susceptibility of condenser piping; a logometric apparatus that can be substituted for cathodic protection when latter is not feasible; brief listing of causes of condenser corrosion and of remedial measures available. (Concluded.) (R4, R10d; Cu, 4-60)

211-R. (French.) **Light Metals and Alloys in Corrosive Media.** J. Herenguel and Pierre Lelong. *Nature,* no. 3271, Nov. 1957, p. 445-450.

Nature of corrosion; laboratory methods of determining corrosivity; types of protection available; corrosivity of Al and Mg alloys, Be, Ti and Zr.
(R-general; Al, Mg, *Be, Ti, Zr*)

212-R.* (French.) **Carbonate of Cyclohexylamine: Its Use as a Volatile Corrosion Inhibitor.** *Produits Chimiques,* v. 60, Nov. 30, 1957, p. 471-473.

Properties, including nontoxicity; applications to ferrous metals, either bare or plated with Cr, Ni, Monel metal, Pb, Zn or Al; corrosion protection afforded machinery during marine transport, industrial equipment during extended shutdowns, machinery and parts subjected to wear. (R10b)

213-R.* (French.) **Molybdenum Alloys and Their Protection Against Oxidation.** H. Buckle. *Recherche Aeronautique,* no. 61, Nov-Dec. 1957, p. 35-52.

Theoretical and practical problems of use of Mo alloys for heat engine parts. Above 500° C. protection must be provided by coatings. Those now available can be used at temperatures in excess of 1700° C., but are not entirely satisfactory when subjected to appreciable mechanical stresses. Best protective coatings now known are made of Ti, Pt and Cr; special Ni-Fe-Co-Cr alloys having unusually low coefficients of expansion; refractory alloys with Ni, Fe or Co bases, with underlying

layer of Ti, Pt or Cr; and alloys containing elements susceptible of forming their own underlying layer, such as $MoSi_2$. Properties of coatings, methods of application and effectiveness of coatings as influenced by application technique. 29 ref. (R1h, L-general; Mo)

214-R. (French.) **Contribution to the Study of the Phenomenon of Frictional Erosion in Hydraulic Turbines.** T. Bovet. *Schweizer Archiv,* v. 23, Dec. 1957, p. 377-388.

Mechanism of abrasion. Study of deterioration of principal parts of Pelton, Francis, Kaplan turbines; preventive measures. (R1c, Q9p, W11n)

215-R.* (Italian.) **Research on the Oxidation of Metals and Alloys in the Molten State. Pt. 6. The Cadmium-Tin System.** Paolo Spinedi. *Gazzetta Chimica Italiana,* v. 87, Dec. 1957, p. 1420-1432.

Study by means of a continous recording thermic balance of oxidation behavior of binary alloys of Cd and Sn; investigation was extended to temperatures much higher than melting. Results discussed in terms of phase diagrams. Alloy containing about 5% Cd showed rather high resistance to oxidation, this property being ascribed to typical structure of the beta phase, which is stable in vicinity of above concentration, and the influence of which is still seen in the liquid phase. Includes study of oxide films as influenced by composition of respective alloys and characterized by decided morphological changes, especially in certain composition ranges. 7 ref. (R1h, M24; Cd, Sn, 14-60)

216-R.* (Italian.) **Research on the Oxidation of Metals and Alloys in the Molten State. Pt. 7. Zinc.** Paolo Spinedi. *Gazzetta Chimica Italiana,* v. 87, Dec. 1957, p. 1433-1439.

Study by continuous recording thermic balance of oxidation behavior of zinc in temperature range between 250-800° C. Oxidation mechanism is probably controlled by same laws in both solid and liquid states, although speed of process appears to be different for each state. Comparison of data obtained from similar studies conducted on other metals previously treated in this series. 20 ref. (R1h, Zn, 14-60)

217-R. Stainless Steels for Corrosion Resistance. L. R. Honnaker. *Chemical Engineering Progress,* v. 54, Jan. 1958, p. 79-82.

Causes, means of avoiding failures in stainless steel equipment resulting from pitting crevice corrosion, intergranular corrosion, stress-corrosion cracking and related phenomena where general corrosion is slight. 6 ref. (R1d, R2h, R2j; SS)

218-R. Corrosion Problems in Pulp and Paper Mills—Present Day Answers. D. F. Roberts. *Southern Pulp and Paper Manufacturer,* v. 21, Feb. 10, 1958, p. 84-87, 126.

(R2, L26, T29r; ST)

219-R. Development and Properties of Uranium-Base Alloys Corrosion Resistant in High-Temperature Water. Pt. 4. Radiation Stability of Uranium-Base Alloys. Westinghouse Electric Corp. *U. S. Atomic Energy Commission,* WAPD-127, Pt. 4, May 1957, 113 p.

27 ref. (R4, 2-62, 2-67; U, *Mo, Cb*)

220-R. Inhibition of Hydrogen Corrosion of Uranium. A. Kreig and J. M. Napier. Union Carbide Nuclear Company. *U. S. Atomic Energy Commission,* Y-1151, July 1, 1957, 37 p.

(R6q, R10b; U)

221-R. Aqueous Corrosion of Zircaloy Clad Thorium. S. Isserow. Nuclear Metals, Inc. *U. S. Atomic Energy Commission,* NMI-1191, Sept. 20, 1957, 25 p. (Available at U. S. Office of Technical Services, $.75.)

12 ref. (R4c, T11, Th, *Zr,* 8-66)

222-R. Corrosion of Monel and 70-30 Cupronickel in Hydrofluoric Acid. Walter J. Braun, Frederick W. Fink and G. Lee Ericson. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1237, Dec. 3, 1957, 18 p. (Available at U. S. Office of Technical Services, $.75.)

(R6g; Ni, *Cu*)

223-R.* (French.) **Search for a Substance With Combined Anti-Oxidizing and Corrosion Inhibiting Properties in Relation to Olein and Iron.** J. P. Sisley, M. Loury and C. Defromont. *Revue Francaise des Corps Gras,* v. 4, Mar. 1957, p. 149-154.

No product now in use in industry combines both properties. Diphenylpara-phenylenediamine and dibeta - naphtyl - para - phenylenedimine are composed of poly-functional molecules and could be used to develop type of product desired. 7 ref. (R10b; Fe)

224-R.* (Italian.) **On the Lag Interval in Hydrogen Reduction of Products of Oxidation of Metallic Iron at High Temperatures.** Agostino Bargone and

Vittorio Gottardi. *Tecnica Italiana,* v. 12, Oct-Nov. 1957, p. 449-455.

Review of research on oxidation of iron and hydrogen reduction of resultant products; experimental observations which explain lag period observed during reduction. Lag is related to composition and morphology of the oxides and to temperature and duration of oxidation process. (R1h, 2-62; Fe)

225-R. Experiences With Filming Amines in Finland. Paavo Kajanne. *Corrosion Prevention and Control,* v. 4, Dec. 1957, p. 49-53.

Use of film-forming amines as internal coatings for boiler and heat transmission tubing to prevent corrosion and loosen corrosion products already formed. 16 ref. (R4c, R10b)

226-R. Influence of Insulation Design on Condensation and Corrosion. N. L. Dolbey. *Corrosion Technology,* v. 5, Feb. 1958, p. 41-44.

Poorly designed and installed insulation, especially if coated with water-resistant paint, will result in a large amount of condensation within the insulation, leading to serious corrosion problems. (R3)

227-R.* Underground Corrosion. Pt. 2. Behavior of Protective Coatings in Soils. Melvin Romanoff. *Corrosion Technology,* v. 5, Feb. 1958, p. 45-48, 56.

Results of field tests on metallic and bituminous coatings of pipes indicate that both methods are reasonably effective. The most common cause of failure was due to injury of the coating during installation of the pipe. (R8, L26a)

228-R. Chemical and Electrochemical Affinities of Corrosion Processes. Pierre Van Rysselberghe. *Corrosion Technology,* v. 5, Feb. 1958, p. 49-52, 62.

Analysis of corrosion reactions applying the concepts of chemical and electrochemical affinities, the principles of equilibrium thermodynamics and the thermodynamics of irreversible processes. (R1a)

229-R.* High Temperature Hydrogen Sulphide Corrosion in Commercial Sovaformer Units. Pt. 2. E. B. Backensto, R. D. Drew and J. N. Vlachos. *Corrosion Technology,* v. 5, Feb. 1958, p. 53-56.

Test results obtained in two commercial sovaformers show that both temperature and hydrogen sulphide are basic variables in this type of corrosion. Aluminizing provides protection from sulphide corrosion attack. Use of 18-8 Cr-Ni alloys is also suggested. (R6g, 2-62; SS, *Al*)

230-R. Two New Accelerated Corrosion Tests. An Assessment. *Electroplating and Metal Finishing,* v. 11, Jan. 1958, p. 15-16.

The acetic acid salt spray test and sulphur dioxide test in the evaluation of electrodeposited coatings. (R11; 8-62)

231-R.* Accelerated Corrosion Testing of Chromium-Plated Articles: Sulphur Dioxide Test. J. Edwards. *Electroplating and Metal Finishing,* v. 11, Jan. 1958, p. 17-22.

Apparatus and procedure. Experimental studies on varying sulphur dioxide concentration, correlation with outdoor exposure, reproducibility in different test cabinets and variation of corrosion patterns for Ni-Cr with and without undercoats of Cu or bronze and Sn-Ni on steel and other Cr-plated metals. 5 ref. (R11; 8-62, *Cr*)

232-R. Materials for Corrosion Control. Frederick W. Fink. *Industrial and Engineering Chemistry,* v. 50, Jan. 10, 1958, p. 129A-131A.

Review of literature; new corrosion problems in nuclear energy field; potentials and limitations of Ti and Zr in corrosion control. 18 ref. (R-general, T11, 10-54; Ti, Zr)

233-R. Alkaline Digester Corrosion. J. J. Wegerif. *Pulp and Paper,* v. 59, Jan. 1958, p. 104-108.

(R2g, T29r)

234-R. Prevention of Corrosion in Steam and Condensate Systems. T. B. Fielden. *Steam Engineer,* v. 27, Jan. 1958, p. 123-125.

Measures to combat steam condensate corrosion by use of filming amines. 7 ref. (R4d)

235-R. Electron Optical Studies of Oxidation Processes Occurring in High Vacuum. E. A. Gulbransen and K. F. Andrew. Paper from "1956 National Symposium on Vacuum Technology", p. 190-201, 202.

6 ref. (R1h, M21e, 1-73)

236-R.* (French.) **Lessons on Electrochemical Corrosion (Provisional Notes). Pt. 3.** M. Pourbaix. *Cebelcor, Rapport Technique no. 49,* July 1957, 65 p.

Part 3 of a series of five covering principal content of course given at University of Brussels and consisting of results of research carried on by Belgian Center for the Study of Corrosion (Cebelcor) in field of wa-

ters, electrochemistry and corrosion. Includes electrochemical oxidation and reduction; other electrochemical reactions; galvanic cells; electrochemical equilibrium diagrams of water, oxygenated water, metals and metalloids, with examples for Cu, Ag, Pb, Sn, Fe, Zn, Al and As. (R1a)

237-R. (French.) **Constitution and Morphology of the Film Formed on the Surface of Pure Iron During High-Temperature Oxidation in Steam.** Jean Paidassi and David Fuller. *Comptes Rendus,* v. 246, Jan. 27, 1957, p. 604-607.

(R1h, R4d; Fe-a)

238-R.* (French.) **Accelerated Corrosion Tests on Chemically Passivated Electrolytic Zinc Coatings on Steel.** Tadeusz Biestek. *Corrosion et Anti-Corrosion,* v. 6, Feb. 1958, p. 59-65.

Zinc coatings passivated in 15 different solutions were subjected to five types of tests and corrosion resistance of respective samples was determined. Chemical passivation appreciably increases corrosion resistance of Zn deposits by retarding appearance of white rust and corrosion of base metal. Most effective passivating solutions are listed. 6 ref. (R10c, R11; ST, *Zn*)

239-R. (German.) **Corrosion in Primary Cooling System of Nuclear Reactors.** T. Jaeger. *Maschinenbau Technik,* v. 6, Sept. 1957, p. 495-505.

Problems caused by the induced activation of impurities in the cooling medium used in nuclear reactors. 27 ref. (R4a, W11p, 3-69)

240-R. (German.) **Corrosion of Titanium in Molten Salt Baths.** M. E. Straumanis and Y. P. Huang. *Metall,* v. 11, Dec. 1957, p. 1029-1032.

10 ref. (R6j; Ti)

241-R. (German.) **Surface and Corrosion Protection of Underground Tubes and Cables With Plastic Wrapping.** Richard Röhm. *Technische Mitteilungen,* v. 50, July-Aug. 1957, p. 38-42.

Application of Coroplast and Corothene wrapping as protection of subterranean tubes and cables in gas works, telephone installations, petroleum industry and mining; technique of application. (R10e, T7g, 4-60; NM-d)

242-R. (German.) **Passivation and Formation of Protective Coats (on Metals) in Water.** Luigi Piatti. *Zeitschrift für Metallkunde,* v. 49, Jan. 1958, p. 42-47.

25 ref. (R4, R10c)

243-R. Aluminum v. Corrosion by Water. E. W. Jackson. *Chemical and Process Engineering,* v. 38, Oct. 1957, p. 391-393.

28 ref. (R4a; Al)

244-R.* Boiler Corrosion and Its Alleviation by Feedwater Conditioning. Pt. 1. Andrew Laird and N. Reast. *Corrosion Prevention and Control,* v. 5, Feb. 1958, p. 35-38.

Survey of types of corrosion such as scab, pitting, necking, grooving, stress-corrosion and caustic cracking. (R4c)

245-R. Survey of Corrosion in Packaging. Pt. 1. D. V. Weatherley. *Corrosion Prevention and Control,* v. 5, Feb. 1958, p. 47-50.

(R10e, T10g)

246-R. New Technique for Measuring the Rate at Which a Solid Surface Is Attacked by a Corrosive Gas. *Corrosion Prevention and Control,* v. 5, Feb. 1958, p. 51-52.

New procedure at the Bureau of Standards employs time-lapse photography of the reacting solid so that a permanent record of the reaction's progress is obtained at specified time intervals. From the photographs an accurate measure of the dimensional changes and thereby the rate of change of mass of the sample can be obtained. (R11a)

247-R. Corrosion Prevention in the Bottling Industry. L. A. Johnson. *Corrosion Technology,* v. 5, Mar. 1958, p. 81-83, 94.

(R-general, L-general)

248-R.* Accelerated High Temperature Oxidation Due to Vanadium Pentoxide. K. Sachs. *Metallurgia,* v. 57, Mar. 1958, p. 123-136.

V_2O_5 found in residual oils used to run gas turbines causes severe corrosion of blades. Results of laboratory tests of this effect under different conditions. 41 ref. (R1h, R7e)

249-R.* (German.) **Intercrystalline Corrosion and Attack at Grain Boundaries.** Friedrich Erdmann-Jesnitzer. *Werkstoffe und Korrosion,* v. 9, Jan. 1958, p. 7-16.

Heat treated Al-Mg alloy showed intercrystalline attack depending on degree of disorientation. Lattice-energy and structure theories distinguish between fine, micro and macro angle grain boundaries. Attack caused by type and form of nonhomogeneous corings of one or more phases at grain boundaries of more than 5° but not by elastic-po-

tential lattice energy. 31 ref. (R2h, M27f; Al, *Mg*)

250-R.* (German.) **Velocity of Dissolution of Zinc and Influence of Inhibitors Upon Decrease of Corrosive Attack in Aqueous Agents.** T. Markovic, Z. Dugi and Lj. Rubinic. *Werkstoffe und Korrosion,* v. 9, Jan. 1958, p. 17-20.

Behavior of 99.9% Zn in aqueous acid and alkaline solutions represented in corrosion current-pH diagram. Equation for inhibition of dissolution of Zn in aqueous solutions of nitric and sulphuric acid containing sodium dichromate. 20 ref. (R10b; Zn)

251-R. (German.) **Corrosion Behavior of Nonferrous Metals in Alkalimono and Alkali Hydrogen Fluorides. Pt. 2. Aluminum in Hydrochloric Acid and Sodium Hydroxide Solutions, Containing Alkalimono and Alkali Hydrogen Fluorides.** W. Köhler. *Werkstoffe und Korrosion,* v. 9, Jan. 1958, p. 20-25.

23 ref. (R6g, R6j; Al, Mg, Si)

252-R. (German.) **Inhibition of the Corrosion of Buried Iron.** T. Markovic, D. Zagar and N. Plavsic. *Werkstoffe und Korrosion,* v. 9, Feb. 1958, p. 73-75.

12 ref. (R8, R10b; Fe, 4-60)

253-R.* (German.) **Electrochemical Measurements in Corrosion Research.** V. Cupr. *Werkstoffe und Korrosion,* v. 9, Feb. 1958, p. 76-82.

Effects of corrosion and passivity on metals and alloys explained with an apparatus which allows a continuous photographic recording of potentials and currents. Measurements are based on electrode polarizations by discontinuous currents which can be modified over a wide range, and which measure the electrode potential in the dead state. Influence of capacity on polarization current and potential. 6 ref. (R11m)

254-R.* (German.) **Cathodic Protection of Buried Refinery Equipment.** P. W. Sherwood. *Werkstoffe und Korrosion,* v. 9, Feb. 1958, p. 82-86.

Corrosion in soil in which a combined action of salt water and oxygen takes place can be prevented by a protective potential generated by direct current or by galvanic cells, and must be more negative than the corrosion potential. Anodes of Mg, Zn and Al; soil conditions, measurements of electric resistance, potential differences, protective potentials, and leakage currents; location of anode installation; horizontal and vertical anodes. 5 ref. (R10d, T29n)

255-R.* (Japanese.) **Polarization Characteristics of Aluminum and Its Alloys.** Goro Ito. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 93-106.

Polarization in chloride solution shows that the cathodic reaction is the rate-determining step and depolarization of the cathode increases the corrosion of the anode. With two dissimilar metals in contact in electrolytic solution, the corrosion current is not dependent on the open circuit potential difference but on the polarization characteristics of the couple. With Al-Cu couple in chloride solution, Cu polarizes in a more marked degree than Al and the cathode controls the corrosion reaction. Contact corrosion of Al, or various metals, with other metals can be inhibited by external e.m.f. and the potential break in cathodic polarization curve for these couples can serve as a criterion of protection. 15 ref. (R1a, Al)

256-R. (Japanese.) **Utilization of Aluminum and Its Alloys in the Wine and Brandy Industry. Pt. 1. Corrosion in Brandy.** Takuichi Morinaga, Shigeo Zaima and Motoo Kagami. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 107-109.

11 ref. (R7f, R7b, T29p, 17-57; Al)

257-R.* (English.) **Effect of Ti, V, W and Zr on the Sulphurization-Resistant Property of Cast Iron at High Temperatures.** Masakazu Shiozawa and Hiroshi Nakai. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 13-15.

Alloy specimens were exposed to hydrogen sulphide at 900° C. for 10 hr. (R6, 2-62, 2-60; CI)

258-R.* (English.) **Corrosion Resistance of Aluminum Diffusion Coated Cast Iron to Molten Caustic Soda.** Shigetomo Ueda. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 67-71.

Extent and rate of corrosion of mild steel, 17% Cr steel, 18-8 stainless steel, cast iron and Al diffusion-coated cast iron exposed repeatedly at 270° to 330° C. to molten caustic soda. (R6j; ST, SS, CI, 8-74, *Al*)

259-R. (English.) **An Electron Diffraction Study of Stainless Steel Corroded at High Temperature. Corrosion in Atmosphere Containing NH_3 Gas.** Tadayuki Nakayama. *Waseda Uni-*

versity, Castings Research Laboratory, Report, no. 8, Nov. 1957, p. 77-80.

Electron diffraction patterns of the surface layers of 13% Cr and 18-8 stainless steel corroded at 700° C. by an atmosphere containing ammonia gas. (R6p, M22h, 2-62; SS)

260-R. (French.) **Historic Copper Pipe.** *Cuivre. Laitons Alliages,* no. 41, Jan-Feb. 1958, p. 41-44.

Analysis of 70-year old pipe shows little corrosion or wear. (R-general; Cu, 4-60)

261-R. (French.) **Diffraction and Electron Microscopic Studies of Natural and Artificial Oxide Films Formed on Pure Tin and on Tinplate.** J. J. Trillat, L. Tertian and S. C. Britton. *Metaux-Corrosion-Industries,* v. 32, Dec. 1957, p. 475-481.

6 ref. (R2r, R1h, M21e, M22; Sn, 8-65)

262-R. (French.) **Corrosion in Atomic Energy Installations.** Leo. F. Epstein, H. Mogard, J. R. Weeks, C. J. Klamut, M. Silberberg, W. E. Miller, D. H. Gurinsky, etc. *Metaux-Corrosion-Industries,* v. 32, Dec. 1957, p. 490-498.

Corrosion of stainless steel by liquid metals (sodium, bismuth-uranium, lead, lead-bismuth eutectics), and zirconium and alloys by water at high temperatures. (R6m, R4d, W11p, 17-57; SS, Zr)

263-R. (German.) **Attack of Water on Aluminum at High Temperatures.** P. Lelong and J. Herenguel. *Metall,* v. 12, Mar. 1958, p. 176-179.

Corrosion of Al investigated by metallographic examination of specimens exposed to water at various temperatures. Three main stages of corrosion are formation of a homogeneous covering layer; intercrystalline effect; and asymmetric point-like corrosion. Increasing temperature accelerates the process. (R4, 2-62; Al)

264-R.* (German.) **Causes of Rapid Rust Film Formation on Cast Iron.** G. Schikorr. *Metalloberfläche,* v. 12, Mar. 1958, p. 81-84.

Chlorine ions penetrate to graphite lamellas and remain there in spite of grinding. Depth of penetration corresponds to the the length of lamellas. A 40% relative atmospheric humidity suffices to start rusting. Almost 200 microns at superficial layer must be removed to prevent rust deposition. (R3; CI)

265-R. Some Basic Corrosion Research at NBS. *Industrial and Engineering Chemistry,* v. 50, Mar. 1958, Pt. 1, p. 55A-56A.

(R4; Cu)

266-R. Crystal Growth Theory for Stress Corrosion Cracking. *Industrial Heating,* v. 25, Apr. 1958, p. 696-698.

(R1e, M26r)

267-R. (French.) **Kinetics of Growth of the Surface Film Formed by Oxidation of Iron in Steam at High Temperatures.** Jean Paidassi and David Fuller. *Comptes Rendus,* v. 246, Feb. 3, 1958, p. 759-761.

(R2q; Fe)

268-R.* (German.) **Corrosion of Metals With Incomplete Coatings.** H. J. Engell. *Archiv für das Eisenhuttenwesen,* v. 28, Nov. 1957, p. 753-760.

Porous coatings of corrosion products such as hydroxides, oxyhydrates and carbonates, commonly referred to as rust, develop through electrolytic precipitation or through direct growth on the metal surface. This coat can be a corrosion preventing influence when it develops a cathodic protection for the base metal. The corrosion process on oil tankers and explanations of local pitting. 16 ref. (R1, R10d, R2j)

269-R.* (German.) **Formation of Flakes on Copper Wires.** E. Lindau. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 504-509.

"Flakes" are the tiny Cu particles adhering but not bonded to the surface of Cu wires. To obtain quantitative estimate of flake formation a certain amount of wire was washed with trichlorethylene under ultrasonic excitation. Reasons for the flake formation were oxide formation during heating in oxidizing atmospheres; surface roughness of the wire during drawing; Cu grades with oxide inclusions. 3 ref. (R1h, S15; Cu, 4-61)

270-R. (Russian.) **Electrochemical Investigation of Corrosion During Comparative Moisture in Atmosphere of 100% and Less.** Yu I. Mikhalovskii and I. D. Tomashov. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1462-1466.

7 ref. (R3, R11m)

271-R.* **Tantalum as a Corrosion Resistant Material.** F. G. Cox. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 44-48.

Tantalum is resistant to most acids and liquid metals at elevated

temperatures but readily attacked by hydrofluoric acid and alkalies. Properties of the metal and effect of chemicals. 11 ref. (R6g, R6m; Ta)

272-R. Corrosion of Car Bodies. K. A. Murrell. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 49-54.

Corrosion of car bodies controlled by design improvement, improved metals and finishes, new materials. (R-general, T21a)

273-R. Survey of Corrosion in Packaging. Pt. 2. D. V. Weatherley. *Corrosion Prevention and Control,* v. 5, Mar. 1958, p. 59-61.

Metal components can be protected by vapor phase inhibitors (also known as volatile corrosion inhibitors). In addition, polyethylene packs and specially treated papers have been developed. (R10e, R10b)

274-R.* Corrosion of Steel. Pt. 1. Protective Action of Oxides of Lead and Zinc. A. K. Choudhury and S. C. Shome. *Journal of Scientific and Industrial Research,* v. 17A, Jan. 1958, p. 30-34.

Results of corrosion tests and electrode potential measurement made to evaluate the protective action of aqueous extracts of pigment and paint coating on steel specimen subjected to corrosion under water. Action of aqueous extract made from dried oil paints consisting of mixtures of lead oxide and/or zinc oxide with linseed oil; protective properties of similar mixtures used as coatings. 9 ref.
(R11, L26n, L14a; ST)

275-R.* Corrosion of Steel. Pt. 2. Inhibitive Behavior of Chromates, Molybdates and Tungstates of Zinc and Lead. A. K. Choudhury and S. C. Shome. *Journal of Scientific and Industrial Research,* v. 17A, Jan. 1958, p. 35-38.

Study of corrosion inhibitive properties of zinc chromate, zinc molybdates, zinc tungstate, red lead, lead chromate, lead molybdate, and lead tungstate. Evaluates extracts made from a dried paint containing the above pigment and linseed oil. 11 ref. (R10b; ST)

276-R. Mass Transfer in Liquid Metal Circuits. A. Draycott. *United Kingdom Atomic Energy Authority,* 342/MR/157, Jan. 1957, 10 p.

Mass transfer of stainless steel constituents in a NaK circuit occurs to an appreciable extent. The amount transferred is dependent upon oxide level and temperature of the system. 4 ref.
(R2a, T11; 14-60)

277-R. (French.) **Determination of Corrosion Resistant Properties of Castings at Various Temperatures.** P. Detrez. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 374-382.

Users should be very specific about working conditions and temperatures in ordering "refractory castings" and foundrymen should be explicit about the qualities of their castings. Causes for poor performance or cracking are graphitization, internal stresses (thermal), corrosion, fusion of phosphorus eutectic. Corrosion causes are variety of structural constituents, diversity of gas composition, different penetration speeds of gases into casting masses.
(R-general, E-general, 5-60, 9-72)

278-R. (French.) **Corrosion Phenomena in Tubular Condensers.** A. J. Maurin. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 383-393.

Prevention through inhibition with potassium permanganate; cathodic protection; chlorination. (To be continued.)
(R4, R10b, R10d, R10g; Cu, ST, 4-60)

279-R. (French.) **The Fight Against Corrosion. Role and Future of Sintered Products. Pt. 1. Powder Metallurgy.** R. Meyer. *Nature,* no. 3275, Mar. 1958, p. 104-107.

(To be continued.)
(R10b, H-general)

280-R.* (French.) **Experimental Conditions for H_2S Corrosion Cracking Tests. Influence of Structure of Mild and Low-Alloy Steels on Their Life in H_2S Under Stress.** E. Herzog. *Revue de Metallurgie,* v. 55, Feb. 1958, p. 123-144.

Comparison of H_2S corrosion cracking phenomena resulting from variety of bending and tensile tests. Factors influencing failures. Investigation facilitated choice of satisfactory steel for piping used at only natural gas deposit in France, where gas has a 15% H_2S content. 8 ref.
(R11s; CN, AY)

281-R* (German.) **Speed of Scaling of Pure Iron in Oxygen at Diminished Pressures and in Carbon Dioxide.** Norbert G. Schmahl, Hans Baumann and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 147-152.

Velocity of scaling of electrolytic iron at 950° and at varying pres-

sures. A linear relationship is found at lower pressures, a parabolic at higher pressures. Annealing of iron in pure carbon dioxide at 950° produces fine crystalline scale; no definite conclusions can be given on scaling regularity. Velocity of scaling is greater with increasing oxygen pressure. (R2q, 3-74; Fe-a)

282-R.* (German.) **Corrosion Behavior of Artificially Produced Hard Zinc Coats.** W. Rädeker. *Metalloberfläche,* v. 12, Apr. 1958, p. 102-104.

Composition and some properties of Zn-Fe alloyed coat; heat treatment. Corrosive effect of atmosphere on treated coat in laboratory and in natural conditions; optimal treatment temperature; limited application of method in practice. (R3, J-general; *Zn*)

283-R.* (Italian.) **Corrosion of Metals at High Temperature by Vanadium Anhydride. Behavior of Alloys Containing Titanium.** A. Burdese and S. Gallo. *Metallurgia Italiana,* v. 50, Jan. 1958, p. 8-14.

Test pieces of Cr, Co and Ni alloys containing Ti were subjected to attack at 700° C. in air and V_2O_5-saturated room for periods of 300 hr. Micrographic and X-ray studies were made of structure of materials used, of mechanism of formation, thickness and constitution of oxide films formed. Presence of Ti improves resistance to hot oxidation in presence of V_2O_5. Observed improvement is related to high stability and thickness of protective film. However, addition of Ti to Ni alloys must be limited as it causes excessive brittleness. 36 ref. (R6p, 2-62, 2-60; Cr, Co, Ni, *Ti*)

284-R.* (Italian.) **Zinc Powder and Zinc Oxide Base Anti-Rust Paints.** Giancarlo Ghisolfi. *Pitture e Vernici,* v. 13, Dec. 1957, p. 833-842.

Anti-rust protection provided by mixtures of Zn powder and Zn oxide in paints with chemically inert bases and oily bases evaluated by salt spray tests and measurement of electrical potential and voltage in corrosion cells. Films produced by paints studied were applied to inert bases, then investigated for permeability, ease of absorption of solutions, possibilities of reaction with electrolytes. Paints with zinc powder-zinc oxide bases in chemically inert vehicle and having composition very similar to that of a Zn-rich paint develop efficient anti-rust action. 5 ref. (R11; NM-g30)

285-R. Service Blistering of Plated Zinc Alloy Die-Castings. V. E. Carter and J. Edwards. *Metal Industry,* v. 92, Mar. 1958, p. 191-192.

(R2n, 5-61; Zn-b, 8-62)

286-R. Cast Stainless Pump Handles Corrosive Electrolytes. E. A. Schoefer. *Plating,* v. 45, Apr. 1958, p. 366-367.

(R6, W13d, 17-57; SS)

287-R. (Czech.) **Effectiveness of Cathodic Protection of Sprayed Metal Coatings (Anodes) in River Water.** M. Svoboda, K. Kolar and B. Knapek. *Korose a Ochrana Materialu,* v. 1, no. 7-8, 1957, p. 107-109.

(R10d, R4a, 8-67; Zn, Al, Mg, 8-67)

288-R. (French.) **Relation Between the Intensity of the Cathodic Protection Current and the Intensity of the Stray Current Circulating in Metallic Underground Pipes.** S. Minc and Z. Feldblum. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 308-314.

(R10d; 5-60)

289-R. (French.) **Special Pipe for Lacq Gas Fields.** A. Madrelle. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 327-330.

Tubing made of special steels (Mn, Mo; Cr, Al, Mo) to resist corrosion by H_2S. (R6g; ST, 4-60)

290-R. (French.) **Determination of Thickness Reduction of Sheet Metals and Steel Pipes Caused by Corrosion.** M. G. Pirou. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 339-347.

Different procedures to determine corrosion including photographic, television, acoustic, ultrasonic, radiographic, electric and magnetic methods. Magnetic is recommended as best. (R11, S14; ST, 4-53, 4-60)

291-R. (French.) **Determination of the Properties of Corrosion Resistant Castings at Different Temperatures.** P. Detrez. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 374-382.

A table of principal characteristics of castings relative to such conditions as temperature at which utilized, whether machined or not, whether under large or small strains, and whether required to withstand thermal shocks. (R2, 2-61, 5-60)

292-R. (French.) **Study of the Intercrystalline Corrosion of 18-8 Stainless Steel by Observation of Internal Friction.** M. Smialowski and W. Drozd. *Corrosion et Anticorrosion,* v. 5, Dec. 1957, p. 394.

(R2h; SS)

293-R. (French.) **Corrosion Test Methods.** W. Wiederholt. *Corrosion et Anticorrosion,* v. 6, Mar. 1958, p. 80-100.

Following types of tests were conducted: exposure to humidity at a constant temperature and at a variable temperature between 20 and 40° C., at a variable temperature in an atmosphere of SO_2 or CO_2, immersion in saline mist, alternate immersion in 3% NaCl solution. (R11j, R11q)

294-R.* (French.) **Study of Intercrystalline Corrosion by Hydrochloric Acid of Very High-Purity Aluminum and Aluminum Purified by the Zone-Melting Technique.** F. Montariol. *Corrosion et Anticorrosion,* v. 6, Mar. 1958, p. 101-106.

Influence of the state of purity of the metal on the selective corrosion at grain boundaries of very high-purity Al in hydrochloric acid. Corrosion is slower for metal of the higher purity, and is accelerated by certain additives (ethyl alcohol) to the attacking agent. 13 ref. (R6g, R2h; Al-a)

295-R.* (German.) **Influence of Temperature Upon the Development of Scale on Pure Iron Exposed to Oxygen.** Norbert G. Schmahl, Hans Baumann and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 83-88.

A new method for the precise determination of constants in the scaling process of pure iron between 480 and 1080° C. 34 ref. (R2q, 2-62; Fe-a)

296-R.* (German.) **Periodic Dissolution of Iron in Soils. Atmospheric Corrosion in Presence of Hydrogen Chloride.** P. Kirkov. *Werkstoffe und Korrosion,* v. 9, Mar. 1958, p. 146-149.

Changes of periodic dissolution are indicated by maximum and minimum solubility curves. Changes are caused by hydroxide layers as corrosion products. Process tends toward a state of equilibrium between acid diffusion and metal dissolution. A new protective layer can result from solubility of the hydroxide layer in the mineral acids. Velocity and mechanism are determined. 9 ref. (R8, R3; Fe)

297-R. (German.) **Corrosion Current-pH Value Diagram of Lead in Dilute Electrolytes.** T. Markovic and V. Bestvina. *Werkstoffe und Korrosion,* v. 9, Mar. 1958, p. 152-154.

Velocity of Pb dissolution in pH range of 1-13. 18 ref. (R1a; Pb-a)

298-R. (Rumanian.) **Qualitative Research on Corrosion Protection Afforded by Protective Coatings.** M. Ciortea. *Petrol si Gaze,* v. 9, Jan. 1958, p. 37-42. (R11, L26)

299-R. Corrosion—What Causes It and How It Happens. Pt. 1. W. A. Koehler. *American Gas Journal,* v. 185, Mar. 1958, p. 24-25. (R1)

300-R. Development of a Cubic Oxide Protective Film on Zirconium. James R. Johnson. *AIME Transactions,* v. 212, Feb. 1958, p. 13-14.

Cubic ZrO_2 is more stable to neutron damage than monoclinic ZrO_2. Small additions of other oxides with ZrO_2 were reacted at 1500° C. and the amounts of cubic phase formed, if any, were determined by X-ray diffraction. Columbium appears to be the most promising alloy for development. (R1h, P18; Zr)

301-R. Zirconium and Titanium Inhibit Corrosion and Mass Transfer of Steels by Liquid Heavy Metals. O. F. Kammerer, J. R. Weeks, J. Sadofsky, W. E. Miller and D. H. Gurinsky. *AIME Transactions,* v. 212, Feb. 1958, p. 20-25.

Zirconium and titanium inhibit solution mass transfer of steels by liquid Bi, Hg and Pb. Bi and Hg absorb on the surface of the steels and subsequently react with nitrogen and possibly carbon to form inert, adherent surface layers of ZrN, TiN, or TiN + TiC. Conditions under which these deposits form. 16 ref. (R2a, R10b; ST, *Zr, Ti*)

302-R.* **Corrosion Mechanism of Uranium-Base Alloys in High Temperature Water.** M. W. Burkart and B. Lustman. *AIME Transactions,* v. 212, Feb. 1958, p. 26-30.

Uranium-base alloys exposed to high-temperature water fail either by uniform oxidation or by sudden cracking and disintegration. Disintegration results from the oxidation of a second phase which is precipitated during the corrosion process. The precipitate has been identified as a metastable hydride. 9 ref. (R4, 2-62; U-b)

303-R.* **Prolonged Oxidation of Zirconium at 350 and 450° C.** Robert G. Charles, Sidney Barnartt and Earl A.

Gulbransen. *AIME Transactions,* v. 212, Feb. 1958, p. 101.

Reaction of Zr with oxygen at 1 atm. pressure was followed at 350 and 450° C. for 500 and 200 hr., respectively. Extrapolation of short-term oxidation data for Zr to obtain the long-term behavior is best done through the cubic equation $w^3 = k_c t$ + constant. 5 ref. (R1h; Zr)

304-R.* Oxidation Rate of Molybdenum in Air. E. S. Bartlett and D. N. Williams. *AIME Transactions,* v. 212, Apr. 1958, p. 280.

Values at temperatures from 1400 to 2150° F. (R1h, 2-61; Mo)

305-R.* Oxidation of Zircaloy-2 and 3A at 300 to 850° C. E. A. Gulbransen and K. F. Andrew. *AIME Transactions,* v. 212, Apr. 1958, p. 281-286.

From 500 to 750° C. the alloys oxidized at a faster rate than pure Zr while below 500° C. the pure metal reacted at a faster rate. The cubic-rate law fits the data best for the abraded specimens. Rate data for chemically polished specimens show a good fit to the parabolic-rate law. 19 ref. (R1h; Zr-b)

306-R.* Intergranular Corrosion Resistance of Austenitic Stainless Steels. A Ferric Sulfate-Sulfuric Acid Test. Michael A. Streicher. *ASTM Bulletin,* no. 229, Apr. 1958, p. 77-86.

A specific test for determining intergranular attack on chromium carbide precipitation in unstabilized steels. Samples are exposed to boiling 50% sulphuric acid and ferric sulphate for 120 hr. Comparison of two specimens—annealed (resistant to attack) and sensitized (heated 1 hr. at 1250° F.) gives difference between general and intergranular corrosion. 19 ref. (R11, R2h; SS-e)

307-R. Corrosion and the Destination of Corrosion Products in a High Pressure Power Plant. Ross C. Tucker. *Corrosion,* v. 14, May 1958, p. 19-22.

Water conditioning, feedwater and steam concentrations, corrosion of steam lines, turbine blade deposits, the collecting of dissolved gases in condensers and dissolved oxygen scavengers. 9 ref. (R4c, W11k)

308-R.* Cathodic Protection of Lead Cable Sheath in the Presence of Alkali From Deicing Salts. Walter H. Bruckner and W. W. Lichtenberger. *Corrosion,* v. 14, Apr. 1958, p. 165t-170t.

Potential gradient tests provide information on effects of salt concentration, pH and potential on corrosion behavior of lead when partially and fully immersed. Criteria for effective cathodic protection are different for portions of lead cathodes below and above the water line. Conditions at the air solution interface require a more negative voltage for protection than below the interface. (R10d, T1b; Pb)

309-R. Basic Concepts and Practical Aspects of Field Corrosion Investigation. Maurice A. Riordan. *Corrosion,* v. 14, Apr. 1958, p. 171t-174t.

Relates electrical measurements to corrosion characteristics of structural metal systems in soil or water. (R4, R8)

310-R.* An Electrical Resistance Method of Corrosion Monitoring in Refinery Equipment. A. J. Freedman, E. S. Troscinski and A. Dravnieks. *Corrosion,* v. 14, Apr. 1958, p. 175t-178t.

Corrosion decreases cross section and consequently the electrical conductivity of metal specimens exposed to refinery fluids at high temperature and in inaccessible locations. Rate of corrosion determined by increase in resistance. Technique successfully used under many conditions of temperature and pressure in vapor and liquid phases with both oil and aqueous media. Allows rapid quantitative determination of corrosion rate and evaluation of effect of operating procedure in corrosion inhibitors. 6 ref. (R11a, R7a)

311-R.* High Temperature Oxidation of Iron-Nickel Alloys. M. J. Brabers and C. E. Birchenall. *Corrosion,* v. 14, Apr. 1958, p. 179t-182t.

Alloys containing 15 to 89% Ni were oxidized in oxygen in brief stages at 1050° C., and equilibrated in argon atmosphere between stages and following oxidation. Metallographic, X-ray diffraction and chemical investigation indicated subscale formed preferentially at grain boundaries. Porosity developed in subscale regions during equilibration, then began to sinter out on longer heating. Clarifies features of iron-rich corner of ternary phase diagram. Structure and composition of wustite and spinel in sub-

scale and outer scale and relative growth rates of these phases. 18 ref. (R1h, M24c; Fe, Ni, O)

312-R.* Controlling Corrosion in Coal-Chemical Plants. C. P. Larrabee and W. L. Mathay. *Corrosion,* v. 14, Apr. 1958, p. 183t-186t.

Resistance of carbon steel, galvanized steel, copper steel, types 304, 316 and 410 stainless steels to corrosive environment in coal chemical plant. Corrosion and surface tests with coal handling equipment, primary coolers, ammonia saturators, light oil recovery equipment and tar stills. 9 ref. (R7d; CN, AY, SS)

313-R.* Reaction of Certain Chlorinated Hydrocarbons With Aluminum. A. C. Hamstead, G. B. Elder and J. C. Canterbury. *Corrosion,* v. 14, Apr. 1958, p. 189t-190t.

Type 3003 Al transfer line failed after handling refined propylene dichloride for a few hours. Laboratory investigation of nature and rate of reaction between Al and propylene dichloride. (R7g; Al)

314-R.* Statistical Concepts in the Testing of Corrosion Inhibitors. C. C. Nathan and E. Eisner. *Corrosion,* v. 14, Apr. 1958, p. 193t-199t.

Static and dynamic corrosion tests with both synthetic fluids and actual fluids from producing oil wells. Fluctuation in weight losses of steel test coupons; variation in rate of attack with concentration of organic adsorption type inhibitors. Statistical analysis of data. 17 ref. (R10b, S12, R7a; ST)

315-R.* Cathodic Protection of Iron in the Temperature Range 25 C—92 C. G. R. Hoey and M. Cohen. *Corrosion,* v. 14, Apr. 1958, p. 200t-202t.

Fluctuations in corrosion rate of iron specimens immersed in sodium chloride solutions observed for various current densities and temperatures. Cathodic polarization curves for iron in 110-ppm. sodium chloride solutions. Corrosion products analyzed by X-ray. Limiting protective current density and open circuit cathodic current density went through temperature maximum at approximately 75° C. Unsteady potentials observed in vicinity of limiting protective current. Current density at which the potential of the iron reaches minus 0.5 volt on the hydrogen scale gave satisfactory potentials. 16 ref. (R10d; Fe)

316-R.* Corrosion Rates of Mild Steel in NH_4NO_3-H_2O Solutions. Norman Hackerman, Ray M. Hurd and Earl S. Snavely. *Corrosion,* v. 14, Apr. 1958, p. 203t-205t.

Corrosion rates of SAE 1021 steel in mixture of ammonium nitrate, ammonia and water were measured at temperatures of 30, 45 and 60° C. Effectiveness of thiocyanate, thourea, 2-mercapto-ethanol and sodium arsenite in inhibiting corrosion. Completely stress-relieved coupons would not corrode. Rate of uninhibited reaction much lower at 45 and 60° C. than at 30° C. 6 ref. (R7j, R10b, 3-66; CN)

317-R.* Effects of Cold Working on Corrosion of High Purity Aluminum in Water at High Temperatures. M. J. Lavigne. *Corrosion,* v. 14, May 1958, p. 226t-228t.

In distilled water at 100° C., high-purity Al cold worked 5 to 50% and all the recrystallized Al samples corrode intergranularly, but materials cold-worked 60% and over are immune. 5 ref. (R4, 2-62, R2h, 3-68; Al-a)

318-R. Methods for Increasing the Corrosion Resistance of Metal Alloys. N. D. Tomashov. *Corrosion,* v. 14, May 1958, p. 229t-236t.

With corrosion controlled by oxygen diffusion, cathodic inclusions do not notably accelerate corrosion. When it is possible to establish prevalent anodic control, cathodic inclusions may promote passivation and consequently considerably reduce the rate of corrosion. 56 ref. (R10d)

319-R.* Corrosion of Zinc by Differential Aeration. G. Bianchi. *Corrosion,* v. 14, May 1958, p. 245t-248t.

Corrosion in molar NaCl solutions under varying conditions of aeration, pH and test time. Formation of differential aeration macrocells is due to passivity of Zn on the zones of the specimen where cathodic reduction of oxygen takes place. The principal process of corrosion is accompanied by local corrosion processes at the cathodic and anodic areas of the macrocell. 4 ref. (R6j, R10c, Zn)

320-R.* The Mechanism of Stress Corrosion of Austenitic Stainless Steels in Hot Aqueous Chloride Solutions. K. W. Leu and J. N. Helle. *Corrosion,* v. 14, May 1958, p. 249t-254t.

Investigation proves that the initial corrosive attack is dependent primarily on the mechanical and chemical behavior of the passivating film already present on the steel or formed during exposure to the corrosive medium and only to a minor extent on the structure of the metal itself. 11 ref.
(R1d, R6j; SS)

321-R.* The Acetic Acid Salt Spray Test. J. H. Hooper. *Institute of Metal Finishing, Bulletin,* v. 8, Spring 1958, p. 79-90.

Relative merit of 1% acetic acid, 5% salt spray tests and other accelerated tests. Found 24-hr. sulphur dioxide test most suitable for Cr-Ni and Cr-Ni-Cu plating on steel; hot or cold acetic acid tests for similar coatings on Zn or brass; hot acetic acid method for anodized high-purity Al. No correlation was found between results with straight 5% salt spray tests and corrosion occurring under atmospheric exposure. 8 ref.
(R11j; ST, Zn, Cu, Al, 8-12)

322-R. Relationship Betwen Magnesium Content and Stress-Corrosion Susceptibility of Aluminium-Magnesium Alloys. W. J. Vance. *Journal of Applied Chemistry,* v. 8, Jan. 1958, p. 18-23.

15 ref. (R1d, 2-60, Al, *Mg*)

323-R. Corrosion in High-Purity Water. *Metal Industry,* v. 92, Apr. 25, 1958, p. 330-333.

(R4e; Ni, Al)

324-R.* Accelerated High Temperature Oxidation Due to Vanadium Pentoxide. K. Sachs. *Metallurgia,* v. 57, Apr. 1958, p. 167-173.

How vanadium pentoxide increases oxidation of Ni, Ni alloys, steel, stainless steel, aluminium bronze and other metals when exposed to high-temperature air or oxygen. Fluxing effect of vanadium pentoxide and resultant increase in diffusion of metal and oxide ion through the protective oxide films. Chemical attack and other secondary effects. Importance of vanadium pentoxide in fuel ash of gas turbines. (To be continued.) 41 ref. (R7d, R1h; Ni, ST, SS, Cu-s)

325-R.* Corrosion of Lead-Base Babbitt Metal. C. I. R. McDougall and E. Klar. *Ontario Hydro Research News,* v. 9, July-Sept. 1957, p. 19-22, 26.

Alloys No. 7 and 8 with 5 and 10% Sn resisted corrosion under all conditions. Alloy No. 15 with 1% Sn resisted corrosion under most circumstances, even when in contact with highly acidic oil. However, when water was present in same oil, a very marked interaction was evident, oil deteriorated rapidly and babbitt surface was corroded. (R7e; Pb, *Sn,* SGA-c)

326-R.* Atmospheric Exposure Tests of Different Types of Electrodeposited Nickel. J. Edwards. *Product Finishing,* v. 11, Mar. 1958, p. 58-66.

Resistance to corrosion in industrial and marine environments of Ni deposited from sulphate-chloride solutions is virtually independent of the additions made to the baths in order to promote brightening, leveling, low stress and so on. This is true whether or not the deposit has a top coat of Cr, provided that the quality of the Cr on different types of Ni undercoat is the same. 7 ref. (R3n, R3p; *Ni,* 8-62)

327-R. Corrosion Properties of Various Materials in High Temperature Waters. C. J. Lancaster. U. S. Naval Engineering Experiment Station. *U. S. Office of Technical Services,* PB 121503, June 1953, 24 p. $.75.

(R4, 2-62)

328-R. The Stress Corrosion and Pyrophoric Behavior of Titanium and Titanium Alloys. D. W. Stough, F. W. Fink and R. S. Peoples. Battelle Memorial Institute. (Office of Assistant Secretary of Defense for Research and Engineering.) *U. S. Office of Technical Services,* PB 121635, Sept. 1957, 56 p. $1.50.

Review. (R1e, P13; Ti)

329-R. Progress Report on the Salt Corrosion of Titanium Alloys at Elevated Temperature and Stress. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121637, Nov. 1957, 57 p. $1.50.

(R6g, 2-62, 3-66; Ti-b)

330-R. Pitting in Ferrous Systems: An Annotated Bibliography. M. Benton. Naval Research Laboratory. *U. S. Office of Technical Services,* PB 131006, June 1957, 129 p. $3.25.

(R2j; Fe, ST; 11-65)

331-R. Development of a Corrosion Resistant Magnesium Alloy. Pt. 1, 2. M. Balicki, D. D'Antonio, A. Kravic, and V. P. Siuta. Polytechnic Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131443, 131444; Aug. 1957, 2 v., 89 p. $2.50.

Novel scheme to improve corrosion resistance of Mg by alloying with elements with lower surface tensions. Preliminary results indicate that alloys containing Sb, Ge, In, Sn and Cd improved corrosion resistance.
(R10g, 2-60; Mg-b, *Ge, In, Sb, Sn*)

332-R. Determination of Intergranular Corrosion by Measuring the Internal Friction. M. A. Vedeneeva. *Zavodskaya Laboratoriya,* v. 23, no. 1, 1957, p. 64-67. (Henry Brutcher, Altadena, Calif., Translation no. 4099.)

(R2h, Q22, 154; SS, ST)

333-R. On the Oxidation of Tungsten at High Temperatures. V. I. Arkharov and Yu. D. Zozmanov. *Fizika Metallov I Metallovedenie,* v. 2, no. 2, 1956, p. 361-369. (Henry Brutcher, Altadena, Calif., Translation no. 4104.)

Previously abstracted from original. See item 405-R, 1956.
(R1h; W)

334-R. Effect of Water Vapor Concentration on the Corrosion of Metals by Chlorine. Kh. L. Tseitlin and V. A. Strunkin. *Journal of Applied Chemistry of the USSR,* v. 29, no. 11, (1957), p. 1793-1800. (Translation by Consultants Bureau, Inc.)

7 ref. (R6g)

335-R. Elemento-Organic Compounds of the Fifth Group of Mendeleev's Periodic System as Inhibitors of Acid Corrosion. S. A. Balezin and M. A. Ignatyeva. *Journal of Applied Chemistry of the USSR,* v. 29, no. 11, (1957), p. 1777-1784. (Translation by Consultants Bureau, Inc.)

Effects of organic compounds containing P, As, Sb and Bi on solution rate of steel in acids in relation to the concentrations of acid and inhibition. 6 ref. (R10b; ST)

336-R. (English.) **Effect of Cathodic Protection on the Corrosion Fatigue of Mild Steel.** Yoshio Minami. *Sixth Japan National Congress for Applied Mechanics, Proceedings,* Mar. 1957, p. 69-70.

(R1e, R10d; CN)

337-R. (French.) **Economics of Cathodic Protection of Conduits.** G. Fauvel. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 331-338.

(R10d; 4-60)

338-R. (French.) **Corrosion of Type 18/8 Stainless Steel: Causes and Prevention.** J. Dedieu and L. Pennec. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 348-358.

5 ref. (R-general, SS)

339-R. (French.) **Oil Industry Fights Corrosion.** J. Tourret. *Metallurgie et Construction Mecanique,* v. 90, Apr. 1958, p. 285-289.

(R-general, T29n)

340-R. (French.) **Passivity of Stainless Steel in Sulphuric Acid. Effect of Heat Treatment Between 1050° and 650° and of Cold Forming.** Carl Carius. *Métaux Corrosion-Industries,* v. 33, Jan. 1958, p. 6-29.

(R6g, R10c, 2-64, 3-64; SS)

341-R.* (French.) **Long-Term Corrosion Tests on Painted Steel Exposed to Atmosphere.** Paul Nylen. *Peintures, Pigments, Vernis,* v. 34, Mar. 1958, p. 116-117.

Corrosion Committee of Royal Academy of Sciences of Sweden has, since 1938, carried out several series of extended tests on plates painted with different types of paints and exposed to atmosphere in various parts of Sweden. Results are reported in terms of influence of climate and nature of paint on intrusion of rust. (R3; ST, 8-70)

342-R.* (French.) **Effect of Low-Temperature Stress Relieving on Stress-Corrosion Cracking.** C. R. McKinsey. *Revue de la Soudure,* v. 14, no. 1, 1958, p. 42-48.

Welded structures are susceptible to stress-corrosion because of the residual stresses that are generally present. A series of tests for determining the effect of low-temperature stress relieving on the stress-corrosion of arc butt welded steel plates showed that stress-corrosion increases with decrease in carbon content and that controlled relieving at low temperature reduces susceptibility of welded plates to stress-corrosion. 11 ref.
(R1d, J1a; ST, 7-51)

343-R.* (German.) **Effect of Small Additions of Antimony on Oxidation Velocity of Lead.** Helmut Hartmann, Wilhelm Hofmann and Wolfgang Stahl. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Apr. 1958, p. 151-163.

Preliminary experiments at 350-500° on tarnishing velocity. Gravimetric determination of oxidation velocity at 600 and 750° and explanation of its results according to the scaling theory. Surface tension is dependent on Sb content.
(R2q, R2r, 2-60; Pb, *Sb*)

344-R.* (Italian.) **Biological Corrosion in a Hydro-Electric Plant in Africa and Role of Organic Products in the Corrosion Process.** Pierre Coulomb. *Vernici*, v. 14, Jan. 1958, p. 69-71.

Corrosion behavior of standard bituminous coatings in installation in Belgian Congo. Factors included aggressivity of waters and abundant deposits of sludge. However, no bacteria of known corrosive action were found in sludge. Harmful action of sludge was therefore attributed to presence of aminic acids and bases, as revealed by chemical analysis and chromatography. Presence of these materials also explains unexpected resistance to corrosion of some red lead paints. (R1g, L26a)

345-R. Influence of Bicarbonate Ion on Inhibition of Corrosion by Sodium Silicate in a Zinc-Iron System. Henry L. Shuldener and Leo Lehrman. *American Water Works Association, Journal*, v. 49, Nov. 1957, p. 1432-1440.

21 ref. (R10b; Zn, Fe)

346-R.* **Fretting Corrosion of Cast Iron.** F. T. Barwell and K. H. R. Wright. *British Cast Iron Research Association, Journal of Research and Development*, v. 7, Apr. 1958, p. 190-202.

Fretting behavior of 12 different cast iron surfaces investigated under seven conditions of lubrication, including the dry condition. Lubricated specimens in the as-cast condition are less susceptible to fretting than annealed specimens. Liquid lubricants appear to be slightly more effective than greases. (R1f; CI, NM-h)

347-R.* **The Influence of Silicon Content on the Growth and Scaling Resistance of Cast Iron With Nodular Graphite.** R. J. Maitland and I. C. H. Hughes. *British Cast Iron Research Association, Journal of Research and Development*, v. 7, Apr. 1958, p. 203-223.

Growth and scaling behavior of nodular irons with 1.2 to 5.7% Si at temperatures within the range 650 to 1000° C. Both growth and scaling proceed relatively slowly and are inhibited by increasing Si contents at temperatures below the austenite transformation range. When the critical temperature range is exceeded or nearly exceeded, growth and scaling become excessive and seem to be promoted by Si. 21 ref. (R2q, 2-60; CI-r, Si)

348-R.* **The Corrosion Resistant Properties of Zirconium. Pt. 1.** F. G. Cox. *Corrosion Prevention and Control*, v. 5, Apr. 1958, p. 39-42.

Purity of Zr affects its corrosion resistance. Low-carbon (0.04%) Zr metal is attacked by HF concentrated H_2SO_4, and solutions of $FeCl_3$ and $CuCl_2$; and is resistant to HCl, H_3PO_4, dilute H_2SO_4 and alkalies. Special alloys, developed for high-temperature use with water. (To be continued.) (R6, 64; Zr)

349-R. The Protection of Overhead Electric Conductors. J. A. Airey. *Corrosion Prevention and Control*, v. 5, Apr. 1958, p. 44-45.

Special coating developed to protect electrical power transmission cables from corrosion, especially in coastal areas. (R3, T1b, L26p)

350-R. An Accelerated Corrosion Test Chamber. W. Hess. *Corrosion Prevention and Control*, v. 5, Apr. 1958, p. 47-51.

Test chamber allowing for atmospheric conditions contains a transparent enclosure, test agents admitted as aerosols and humidity and temperature control features. (R11j, R3, 1-53)

351-R. The Protection of Motor Vehicles From Corrosion. *Corrosion Prevention and Control*, v. 5, Apr. 1958, p. 52, 54, 73.

The combination of sodium benzoate and sodium nitrite have been effective corrosion inhibitors in automobile radiators with or without ethylene-gylcol antifreeze. Automobile mufflers may be protected from corrosion by the use of Zn-coated steels or Zn paints. Al alloy parts are lighter and anodized parts are effective for trims. (R10b, T21c, L16, L26; Al-b)

352-R. Surface Protection of Austenitic 16% Chromium, 14% Nickel Steel From Intergranular Corrosion. Yu. N. Griboyedov. *Metallovedenie i Obrabotka Metallov*, Mar. 1958, p. 42-48. (Henry Brutcher, Altadena, Calif., Translation no. 4176.)

Protection of steel by surface decarburization in hydrogen atmosphere. Techniques; optimal composition of atmosphere. Effect of long-term aging on the tendency to corrosion; mechanical properties of decarburized steel. (R2h, R10c; SS)

353-R. (Czech.) **Resistance of Materials to Corrosive Media.** Alois Zaple-

talek. *Zvaranie,* v. 7, Apr. 1958, p. 102-109.

Physical conditions for rendering materials resistant to corrosive media encountered in the chemical industry. Examples of corrosion arising under conditions other than those encountered in the chemical industry. 4 ref. (R6, R7, R10)

354-R. (French.) **Classification of Cast Iron Qualities According to Its Resistance at Various Temperatures.** Pierre Détrez. *Fonderie,* v. 146, Mar. 1958, p. 136-142.

Resistance to corrosion, and chemical composition of pearlitic cast iron. (R-general, 2-61; CI)

355-R. (German.) **Electrochemical Investigations of Pure Titanium and of Alloy TiMo30.** O. Rudiger and R. W. Fischer. *Technische Mittelingen Krupp,* v. 15, no. 7, Dec. 1957, p. 194-202.

Corrosion resistance of Ti is result of the titanium dioxide—titanium hydride layer. Measurement of potential provides the means of studying formation and dissolution of protective layers. 10 ref. (R11m; Ti, *Mo*)

356-R. (Russian.) **Micro-Electric Chemical Method for Study of Corrosion of Metal Under Stress.** A. V. Ryabchenkov, V. M. Nikiforova and V. F. Abramova. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 167-173.

(R11s)

357-R. (Russian.) **Investigation of Corrosion and Electro-Chemical Processes in Metals by Means of Ionizing Radiation.** I. L. Rosenfel'd and E. K. Oshe. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 346-348.

(R11a, S19)

358-R. Corrosion of Air Pipelines. German Methods of Protecting Steel. Franz Eisenstecken. *Iron and Coal Trades Review,* v. 175, Dec. 20, 1957, p. 1423-1424.

(R10b, 4-60; ST)

359-R.* Accelerated High Temperature Oxidation Due to Vanadium Pentoxides. Pt. 2. K. Sachs. *Metallurgia,* v. 57, May 1958, p. 224-232.

Residual oils from the distillation of crude oils are rich in a corrosive ash, which may clog up a gas turbine and attack metal components operating at high temperatures. Phenomenon attributed to the vanadium pentoxide in the ash, either alone or in combination with other substances. A variety of methods suggested for overcoming the problem. 41 ref. (R1h, R7d; SS)

360-R.* Lab Inhibitor Stops DEA Corrosion. J. D. Sudbury, O. L. Riggs and J. F. Leterie. *Petroleum Refiner,* v. 37, May 1958, p. 183-184.

Corrosion studies of alkanolamine systems revealed a peculiar type of thread-like corrosion called filiform corrosion. New inhibitor controls it in laboratory tests. (R10b, R7f)

361-R. (English.) **Cargo Space Corrosion in Tanker Ships.** W. G. Richards. *Teknisk Ukeblad,* v. 104, Oct. 24, 1957, p. 869-874.

Methods for overcoming severe corrosion of cargo tanks exposed to white or black petroleum products. 16 ref. (R4b, R7d, T26q; ST)

362-R. Structure of Scale on Hot Rolled Strips and Sheets. Walter Fackert. *Stahl und Eisen,* v. 76, Dec. 15, 1958, p. 1705-1710. (Iron and Steel Institute Translation no. 589.)

Previously abstracted from original. See item 87-R, 1956. (R2q, F23; ST)

363-R.* (French.) Influence of Hemp Cores on Corrosion of Metal Cables. *STZ, Bohler Stahl,* v. 54, May 2, 1958, p. 392-397.

Chlorides, particularly sodium chloride, present in hemp are major cause of internal corrosion of steel cables if not kept well greased. Wash with distilled water is effective treatment for removal of sodium chloride before fabrication of cable. (R6j, T7g; ST)

364-R.* (German.) The "Supertemperature" Which Appears During Scaling of Pure Iron and Its Theoretical Explanation. Norbert G. Schmahl, Hans Baumann and Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 41-46.

"Supertemperature" is defined as the excess temperature of the specimen over the ambient temperature of furnace. Through new experiments a mathematical description of the temperature curve in dependence of time was made possible. A graphic method permits the determination of the constant of heat transfer and the temperature of the specimen. 10 ref. (R2q, P11k; Fe-a)

365-R. (German.) **Comparative Inhibiting Effect of Organic Compounds in Aqueous Solutions.** W. Funke and K. Hamann. *Werkstoffe und Korrosion,* v. 9, Apr. 1958, p. 202-216.

Protective effect of a number of organic compounds on steel sheet. 35 ref. (R10b; ST, 4-53, NM-b)

366-R.* (German.) **Corrosion of Distillery Equipment.** Dietmar Plottner. *Werkstoffe und Korrosion,* v. 9, May 1958, p. 261-262.

Copper is especially sensitive to hydrogen sulphide and a considerable quantity of grayish black copper sulphide accumulates in the receptacle of a Cu still. (R7k, T29; Cu)

367-R.* (German.) **Survey of Polish Publications on Accelerated Corrosion Tests of Electroplated Coatings to Determine Their Resistance to Corrosion.** Tadeusz Biestek. *Werkstoffe und Korrosion,* v. 9, May 1958, p. 271-273.

Salt spray test, immersion tests in distilled water, in ammonium chloride solutions and in artificial industrial atmospheres. Accelerated tests of phosphate coatings on steel. 11 ref. (R11j; ST, 8-12)

368-R.* (German.) **High-Temperature Corrosion by Hydrogen Sulphide—Experiments Made in Petroleum Refining.** Peter W. Sherwood. *Werkstoffe und Korrosion,* v. 9, May 1958, p. 273-277.

Attack causes loss of metal and formation of large crusts which block the passages and impede the transfer of heat. Type of crusts depends on the sort of steel used. High Cr-Ni alloys proved to be good except at high temperatures. For practical use 18-8 Cr-Ni steel has sufficient resistance. 6 ref. (R7k, 2-62; SS)

369-R.* (German.) **Investigations Into the Stress-Corrosion of Alpha Brass in Ammonia Vapor. Pt. 3. A Method for Testing the Stress-Corrosion Susceptibility of Brass Pieces Under the Influence of Ammonia.** F. Aebi. *Zeitschrift für Metallkunde,* v. 49, Feb. 1958, p. 63-68.

Susceptibility of brass to season cracking is caused by development of ammonia from various origins. The conventional mercury test is unsatisfactory, because brass behaves differently in the presence of ammonia. A new testing method with ammonia was developed, which permits the correct observation of ammonia concentration and temperature. (R1d, R7j; Cu-n)

370-R.* (Italian.) **Caustic Cracking of Mild Boiler Steel. Pt. 1. Theories on Cause and Nature of This Phenomenon.** Nello Collari and Piero Virdis. *Calore,* v. 29, Feb. 1958, p. 47-57.

Pros and cons of theories based on (1) internal pressure exercised by hydrogen or hydrocarbides, (2) intergranular precipitation of iron oxides and azides, (3) formation of oxide film, (4) mechanical causes such as permanent deformation, stresses, (5) distortion of intergranular boundaries. 26 ref. (R2h, T26q; CN)

371-R. (Russian.) **Method for Study of Inertness on Metal Surfaces.** I. D. Tomashov, G. P. Chernova, R. M. Al'tovskii and G. K. Blinchevskii. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 299-303.

Electrochemical method for cleaning and studying metal surfaces under 30% solution of H_2SO_4. (R11m, R6g, L13n)

372-R.* (Pamphlet.) **Corrosion and Its Prevention.** 1958 Edition. 25 p. Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. $.75.

Corrosion as it affects air conditioning and refrigeration industry. Atmospheric, water circuit corrosion, refrigerant circuit corrosion and industry practice and recommendations for combating corrosion. 8 ref. (R-general, W 10g)

373-R. (Book.) **1954-1955 Bibliographic Survey of Corrosion.** A. Irene Humphrey. *National Association of Corrosion Engineers,* no. 58-1, 1958, 468 p. $20.

(R-general, 11-65)

374-R. Corrosion—What Causes It and How It Happens. Pt. 3. W. A. Koehler. *American Gas Journal,* v. 185, May 1958, p. 39-41.

(R-general)

375-R.* Nitric-Hydrofluoric Acid Evaluation Test for Type 316L Stainless Steel. Donald Warren. *ASTM Bulletin,* no. 230, May 1958, p. 45-56.

A 10% nitric, 3% hydrofluoric acid test for intergranular corrosion resistance of Type 316L stainless steel. Test is sensitive to damaging carbide precipitation in the grain boundaries of the steel but is insensitive to the presence of sigma phase. 17 ref. (R2h, R11; SS)

376-R. Corrosion Properties of Tantalum. Clifford A. Hampel. *Corrosionomics,* v. 3, no. 2, 1958.

(R1; Ta)

377-R.* **Vapor-Phase Corrosion Inhibitors.** S. Rowden. *Corrosion Technology,* v. 5, Apr. 1958, p. 117-121, 126.

Reviews principal classes of volatile corrosion inhibitors; their chemical composition, possible mode of action, effects of environmental temperature, pH, water and vapor pressure of inhibitor and effectiveness of protection for various metals. 13 ref. (R10b; Cu, CI, Mg, ST, Zn)

378-R. **The Protection of Motor Vehicles From Corrosion.** *Corrosion Technology,* v. 5, Apr. 1958, p. 129-130.

Abstracts of five papers from symposium at Institute of Mechanical Engineers including experience with Al alloys, sodium benzoate and sodium nitrite inhibitors in engine coolants. Inhibitors for ethylene glycol water coolants and materials for minimizing exhaust system corrosion. (R10b, T21; Al, Cu, Ni, ST)

379-R.* **Corrosion of Some Metals and Alloys in Uranium Hexafluoride.** D. Heymann and F. E. T. Kelling. *Corrosion Technology,* v. 5, May 1958, p. 148-151, 158.

Corrosion rate for carbon, low-alloy and stainless steels, Al, Cu and Ni alloys exposed to uranium hexafluoride at 80° C. for periods up to two months. Ni, Monel, Cu, Al and stainless steel have excellent corrosion resistance. Ti and ordinary steels show good resistance. (R6p; AY, CN, SS, Al, Cu, Ni, Ti)

380-R. **Electrochemical Behavior of Zinc in Alkaline Solutions. Pt. 1. Constant Current Measurements.** Indra Sanghi and W. F. K. Wynne-Jones. *Indian Academy of Sciences, Proceedings,* v. 47A, Feb. 1958, p. 49-64.

30 ref. (R1a, T1; Zn)

381-R.* **Corrosion-Rate Data Can Be Exact.** *Marine Engineering Log,* v. 63, May 1958, p. 57-61.

Corrosion data for tanks and tankers by means of thickness measurements utilizing Mylar film, ultrasonics, gamma radiography and electrical resistance. (R11a, S14, T22)

382-R.* **Corrosion of Zinc Plated Steel.** Russell H. Wolff. *Metal Finishing,* v. 56, June 1958, p. 46-52.

Corrosion observed in exposure to 20% salt spray fog (ASTM B117-49T) and outdoors. Test panels were prepared with and without a supplementary chromate dip. Weight changes observed periodically. 6 ref. (R11j, R3; ST, 8-12, *Zn*)

383-R. **Corrosion of Mild Steel in Some New Zealand Soils.** H. R. Penhale. *New Zealand Journal of Science,* v. 1, Mar. 1958, p. 52-69.

8 ref. (R8; CN)

384-R. (Czech.) **Corrosion of Steel Protected With Oil Films by Water Vapor.** Robert Bartoniak. *Chemicke Listy,* no. 52, 1958, p. 190-195.

10 ref. (R4, R10f; ST)

385-R. (Czech.) **Corrosion of Aluminum by Hydrogen Sulphide.** Karel Smrcek, Ivan Sekerka and Vladimir Seifert. *Chemiske Listy,* no. 52, 1958, p. 196-200.

8 ref. (R6g; Al-b)

386-R. (French.) **Role and Future of Sintered Products. Pt. 2. Sintered Products and Corrosion: Cermets.** R. Meyer. *Nature,* no. 3276, Apr. 1958, p. 134-138.

(R-general; 6-69, 6-70, 6-72)

387-R.* (German.) **Influence of Coatings on Stress-Corrosion Cracking of Steel.** Hubert Gräfen. *Archiv für das Eisenhüttenwesen,* v. 20, Apr. 1958, p. 225-229.

Effect of coatings on intercrystalline corrosion of unalloyed and alloyed steels in nitrate solutions with addition of halogenides or chromates. Role of oxygen. Transcrystalline stress-corrosion of austenitic steels in chloride solutions with and without addition of oxygen. (R1d; ST, 8)

388-R.* (Hungarian.) **Changes of Structure and Manufacturing Defects Caused by Scaling, in Hot Rolled Bronze.** Z. Hegedus. *Acta Technica,* v. 19, no. 3-4, 1958, p. 363-369.

Surface cracks formed at the first passes of hot rolling are connected with de-tinning of the surface and formation of SnO_2 in the atmosphere of the oxidizing furnace. Formation of scale proceeds in two steps. First, the Sn content of the alpha-crystal oxidizes into SnO_2 and only after complete detinning, the Cu oxidizes. Thickness of the detinned layer is a function of the homogenization temperature and the time. 5 ref. (R2q, F23, 1-66; Cu-s)

389-R.* (Japanese.) **Sulphur Corrosion of Cast Iron.** Yo. Serita. *Japan Foundrymen's Society, Journal,* v. 30, Feb. 1958, p. 88-95.

Specimens of pure iron, Fe-C alloy and Fe-C with a third element (Cr, Mn, Al or V) were heated with pure sulphur in a silica tube. Ferrite was corroded easily but cementite had good resistance. Specimens with added third element showed good resistance to corrosion except for Mn. (R6q, Fe, CI, *S*)

390-R. New Clue to Corrosion. *Chemical and Engineering News,* v. 36, June 16, 1958, p. 48.
(R11,W13b; SS)

391-R.* Corrosion of Metals in Ethylene Glycol Solutions. R. J. Agnew, J. K. Truitt and W. D. Robertson. *Industrial and Engineering Chemistry,* v. 50, Apr. 1958, p. 649-656.

Corrosion of hot rolled steel, cold rolled Cu and brass, Al and cast Fe under various pH and temperature conditions. 12 ref.
(R7f; ST, Cu, Al, CI)

392-R.* The Corrosion of 2½% Cr-1 Mo Steel by Liquid Bismuth. G. W. Horsley and J. T. Maskrey. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 139-148.

Dynamic corrosion of supeheater tubing by liquid bismuth studied in thermal convection loops working with maximum temperatures up to 625° C., temperature gradients up to 150° C., and fluid velocities of 3-4 mm. per sec. Effect of adding 250-500 ppm. Zr to the Bi as an inhibitor. 8 ref. (R6m; AY, *Bi*)

393-R.* Formation of the Delta-Phase by Oxidation of Alpha-Titanium. I. Koncz and M. Koncz-Deri. *Periodica Polytechnica,* v. 1, no. 1, 1957, p. 67-87.

Oxidation of iodide titanium studied in a range of 570 to 820° C., and a pressure of 2 to 5 mm. Hg in pure oxygen, for periods up to 210 min. Dense, adherent oxide layers show rectifying properties; the presence of delta-phase Ti in these layers verified by X-ray analysis. Diffusion coefficient of oxygen in alpha Ti determined. Possible explanation for mechanism of the oxidation process. 12 ref.
(R1h, N1b; Ti)

394-R. Effects of Carbon Content on the Rate of Dissolution of Dingot Uranium in Nitric Acid. A. L. Bement and J. L. Swanson. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission,* HW-52430, Nov. 11, 1957, 20 p. (Order from Office of Technical Services, Washington 25, D. C.) $.75.

Carbon additions made to dingot uranium by vacuum casting with a high-frequency electronic heater varied from 150 to 1500 ppm. The specimens were beta heat treated, then dissolved in nitric acid. Dissolution rates were determined for the linear, initial portion of the weight-loss-versus-time curves. The rates so obtained were compared with those for samples of ingot, and normal and high-carbon dingot uranium. The effect of grain size on the dissolution rate can be expressed as a power function.
(R6g, 2-60; U)

395-R.* Pit Depth Measurements as a Means of Evaluating the Corrosion Resistance of Aluminum in Sea Water. T. J. Summerson, M. J. Pryor, D. S. Keir and R. J. Hogan. Paper from "Metals", ASTM STP No. 196, p. 157-175.

Quantitative method based on a statistical treatment of penetrometer measurements of every pit present on test specimens immersed in sea water for periods up to 24 months. Normal frequency distributions were obtained by plotting the frequency of pitting against the square root of the pit depth. Calculations of the mean square root pit depth, the standard deviation and standard error of the mean square root pit depth are shown. 10 ref.
(R11, R4b, S12; Al)

396-R. Corrosion of Uranium, Thorium, and Uranium Alloys in Sodium and Organics. Harry Pearlman. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 565-587.

Corrosion rate of uranium and its alloys depends strongly on the impurity and content (especially oxygen) of the liquid metal. In capsule-type static corrosion experiments, made with liquid metal with oxygen content near 0.01% (100 ppm.), corrosion rates are of the order of 10 mg. per sq. cm. per month at temperatures up to 750° C. UO_2 and UO have been identified as corrosion products. 30 ref.
(R6m, R7; U, Th)

397-R.* (French.) **Chromium-Aluminum Steels, Their Properties and Applications.** E. Herzog. *Corrosion et Anticorrosion,* v. 6, Apr. 1958, p. 117-126.

Principal characteristics of Cr-Al steels. Resistance to fissuring in solutions of nitrates and in hydrogen sulphide. Surface condition and corrosion rate; transformations and mechanical properties; results of corrosion tests.
(R-general; AY, *Cr, Al*)

398-R.* (French.) **Study of the Internal Corrosion of Pipes in the Transport and Distribution of Purified City Gas Under Various Pressures.** J. Mor-

let. *Corrosion et Anticorrosion,* v. 6, Apr. 1958, p. 127-131.

Extent to which the corrosive action of purified city gas on soft steel pipe, in the absence or presence of condensed water, depends on its oxygen and carbon dioxide content and on pressure. Corrosion was found to be independent of pressure and of CO_2 content. Possibility of considerably decreasing the corrosive action of purified city gas by limiting its oxygen content or by dehydrating it, the latter being the more effective procedure.
(R7g; CN, 4-60)

399-R.* (French.) **Stress-Corrosion of Aluminum Alloys.** F. A. Champion. *Corrosion et Anticorrosion,* v. 6, Apr. 1958, p. 132-140.
21 ref. (R1d, Al-b)

400-R. (French.) **Corrosion Control in Industry.** J. Strebelle and M. Stassin. *Métaux Corrosion-Industries,* no. 391, Mar. 1958, p. 115-124.
Problems of corrosion classified according to their characteristics and the protective means most frequently applied. Illustrations of typical corrosion in industrial machinery. (R-general, R10)

401-R.* (French.) **Rapid Detection and Location of Corrodibility in Protective Coatings on Metal.** G. Blet. *Peintures, Pigments, Vernis,* v. 34, Apr. 1958, p. 160-163.
Tests of a nonconductor coating on iron base, completed in 2 hr. by use of porosimeter, confirmed by salt spray tests requiring three weeks and costly equipment. Porosimeter is useful for rapid check of corrosion potential, but will not reveal existence of blind pores beneath surface of coating which can become source of rapid corrosion if even slight abrasion occurs.
(R11, 1-53; Fe, 8-70)

402-R.* (Japanese.) **Effect of Manganese and Chromium on the Characteristics of Aluminum-Magnesium (3-5%) Wrought Alloys. Pt. 2.** Rihei Kawachi. *Light Metals (Tokyo),* v. 8, Mar. 1958, p. 14-23.
To confirm the effect of Mn on the Al-Mg alloy as well as the effect of Fe, Si, Cu and Ti on an alloy of 4-4.5% Mg, 0.5% Mn, and 0.2% Cr, with respect to corrosion resistivity and changes of tensile strength, samples were immersed in sea water for up to 12 months. Al-Mg binary alloys are best; addition of Mn, Cr, Fe or Cu decreases corrosion resistance; effects of Si, Zn and Ti are small.
(R4b, 2-60; Al, *Mg, Mn*)

403-R. (Russian.) **Determination of Thickness of Moisture Film on Metals During Atmospheric Corrosion.** N. D. Tomashov and A. A. Lokotilov. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 425-427.
Electrochemical procedure employing specially designed adsorption apparatus for enlarging area of tested specimen. 11 ref.
(R3, R11m)

404-R. (Russian.) **Device for Measurement of Corrosion Effect of Lubricants at Moderate Temperatures.** G. I. Fuks and L. V. Timofeeva. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 427-429.
(R7e, R11, 1-53; NM-h)

405-R. Thermogalvanic Corrosion. V. V. Gerasimov and I. L. Rozenfeld. *Academy of Sciences, Bulletin,* no. 1, 1957, p. 29-31. (Translation by Consultants Bureau, Inc.)
Thermogalvanic corrosion depends on the potential difference between the cold and hot electrodes, the electrical conductivity of the solution, the distance between the electrodes and the overvoltages of the anode and cathode processes. Thermogalvanic corrosion of Fe, Cu, Ni and Pb in neutral, alkaline and acid solutions investigated for different temperature differences and relative electrode areas and with and without stirring of the electrolyte. 4 ref.
(R1a; Fe, Ni, Cu, Pb)

406-R.* Quantitative High-Temperature Oxidation of Porcelain Enameled Iron. H. G. Lefort and A. L. Friedberg. *American Ceramic Society, Journal,* v. 41, June 1, 1958, p. 216-226.
Oxidation studied as a function of time and temperature on both bare and enameled iron. Specimens were subjected to variations in enamel thickness, thickness of electroplated nickel deposit, and surface preparation of the iron. The rate of oxidation of enameled iron was lower than that of bare specimens at all temperatures.
(R1h, 2-62; Fe, 8-71)

407-R. Irradiation as a Corrosion Accelerator. *Australasian Manufacturer,* v. 43, May 10, 1958, p. 52, 54-58.
Nuclear reactor behavior of Be, stainless steel, Al, Mg and Zr.
(R-general, 2-67, T11; Be, SS, Al, Mg, Zr)

408-R. The Corrosion Resistance of Titanium. J. B. Cotton and H. Bradley. *Chemistry and Industry,* May 31, 1958, p. 640-646.
(R-general; Ti)

409-R.* Note on the Characteristics of Potential Time Curves for Painted Non-Ferrous Metals. J. H. Greenblatt. *Journal of Applied Chemistry,* v. 8, Apr. 1958, p. 229-232.

Potentials of steel, Al, brass and Cu rods overcoated with various paints were measured in seawater over a period of time. Potentials obtained in all cases were determined by the substrate metal rather than the paint coating used. The potential-time curves on Cu, brass and Al have the same characteristics as those on steel. 5 ref. (R11m, R4b; Cu, Al, ST)

410-R.* Corrosion of Steel in Moist Air. J. T. Crennell. *Journal of Applied Chemistry,* v. 8, Apr. 1958, p. 270-272.

Specimens of steel stored at room temperature and approximately 100% relative humidity for periods up to seven years have shown a remarkable absence of corrosion. (R4, ST)

411-R. What Socony Mobil Learned About Corrosion in Cat Reformers With Naphtha Pretreaters. E. B. Backensto and R. W. Manuel. *Oil and Gas Journal,* v. 56, May 19, 1958, p. 131-135.

7 ref. (R7a)

412-R. Corrosion of Reinforcing Steel in Concrete in Marine Atmospheres. D. A. Lewis and W. J. Copenhagen. *South African Industrial Chemist,* v. 11, Oct. 1957, p. 207-219.

Concrete, in which steel is normally passive, when penetrated by salt water and air allows micro and macro corrosion to proceed. Externally applied coating can reduce corrosion significantly. 19 ref. (R4b; ST)

413-R. The Effect of Temperature and Oxygen Content of Sea Water on the Corrosion of Welded Seams of Ice Breakers. Eino Uusitalo. *Suomen Kemistilehti,* v. 31, no. 3, 1958, p. 170-174.

(R4b, T22g; 7-51)

414-R.* Corrosion and Ignition of Titanium in Fuming Nitric Acid. John B. Rittenhouse. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 145-160.

Corrosion of Ti and its commercial alloys at 25, 54 and 71° C. Corrosion rates increase with increasing nitrogen dioxide in the range 0 to 20% and decrease with increasing water in the range 0 to 2%. Ignition or pyrophoric reactions can be initiated by impact or friction after exposure to fuming nitric acid containing from 0 to 1.25% water and from 2.5 to 28% nitrogen dioxide for periods exceeding 4 hr. (R6g; Ti)

415-R. (English.) **Investigation on the Oxidation Mechanism of Titanium.** P. Kofstad, K. Hauffe and H. K. Jollesdal. *Acta Chemica Scandinavica,* v. 12, no. 2, 1958, p. 239-266.

38 ref. (R1h, 2-61; Ti)

416-R.* (Russian.) Investigation of High-Temperature Oxidation of Some Iron-Tungsten Alloys. Yu. D. Kozmanov. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 74-81.

Alloys investigated contained up to 60% W. The alloy up to 16% W has greater resistance to heat than pure iron; alloying with W strongly increases heat resistance in the 700-800° C. region, but at 1100° C. the oxidation of the alloy differs little from that of iron. At high temperatures there is an important interaction between iron and tungsten oxides. 10 ref. (R1h, Fe, W)

417-R. Corrosion in Catalytic Reforming and Associated Processes. E. B. Backensto. *American Petroleum Institute, Proceedings,* v. 37, 1957, p. 87-92.

Summary report of the panel on reformer corrosion to the Subcommittee on Corrosion, Committee on Refinery Equipment. 17 ref. (R-general, T28n)

418-R. Hydrogen Attack of Steel in Reformer Service. A. R. Ciuffreda and Warren D. Rowland. *American Petroleum Institute, Proceedings,* v. 37, 1957, p. 116-128.

Case history in which three internally insulated carbon-steel catalytic reactors suffered permanent damage by hydrogen over one year. Attack varied in severity and location, depending upon metal temperature. 5 ref. (R6g, T28; ST, *H*)

419-R. Corrosion in Crude-Oil Processing—Low pH Versus High pH. J. A. Biehl and E. A. Schnake. *American Petroleum Institute, Proceedings,* v. 37, 1957, p. 129-134.

7 ref. (R7a, T28n)

420-R. Influence of Bicarbonate Ion on Inhibition of Corrosion by Sodium Silicate in a Zinc-Iron System. Henry L. Shuldener and Leo Lehrman. *American Water Works Association Journal,* v. 49, Nov. 1957, p. 1432-1440.

21 ref. (R10b; Zn, Fe)

421-R. Right Material Cuts Pump Corrosion. F. R. Drahos. *Chemical*

Engineering, v. 65, Mar. 10, 1958, p. 162-166.
(R-general, W13d; SGA-g)

422-R. Underground Corrosion and Cathodic Protection of Gas Pipelines. J. S. Gerrard. *Gas Journal*, v. 293, Mar. 5, 1958, p. 503-506.
Nature of the attack; methods of corrosion reduction; magnesium anodes and impressed current systems. (R10d, T26r)

423-R. Oxidation of Metals. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 496-502.
Literature review for the past year. (R1h)

424-R.* Current and Potential Relations for the Cathoric Protection of Steel in Salt Water. W. J. Schwerdtfeger. *National Bureau of Standards, Journal of Research*, v. 60, Mar. 1958, p. 153-159.
Laboratory investigation on cathodic protection of steel specimens exposed for 60 days to both stagnant and aerated city water, to which was added 3% NaCl. Significance of potential as a criterion for protection. Optimum protection was achieved when specimens were controlled at −0.77 volt with reference to the saturated calomel half cell. 8 ref. (R10b; ST)

425-R. Mass Transfer in Liquid Metal Systems. Pt. 2. Isothermal Transfer. J. W. Taylor and A. G. Ward. *Nuclear Power*, v. 3, Mar. 1958, p. 101-105.
12 ref. (R2a; 14-60)

426-R. Cathodic Protection May Boost Corrosion. C. Breckon. *Petroleum Refiner*, v. 37, Mar. 1958, p. 189-190.
In the case of nonferrous alloys, service results show cathodic protection could be harmful to exchanger tubes. Superior results are achieved when Zn or Mg anodes are replaced by Fe anodes. (R10d, T28n)

427-R. Design to Cut Cathodic Protection Costs. O. W. Everett. *Pipe Line Industry*, v. 8, Mar. 1958, p. 40-43.
Pipe line installation and corrosion protection. (R10b; ST, 4-60)

428-R. Products Pipe Line Failure Under Cathodic Protection. Walter H. Bruckner. *Pipe Line News*, v. 30, Mar. 1958, p. 45-47.
(R10d; T26r)

429-R. Influence of Some Organo-Element Compounds on the Solution Rate of Carbon Steel in Inorganic Acids. S. A. Balezin and M. A. Ignatyeva. *Academy of Sciences of the USSR, Proceedings*, v. 109, July-Aug. 1956, p. 459-461. (Translation by Consultants Bureau, Inc.)
5 ref. (R10b, R6g; CN)

430-R.* Kinetics of Oxidation in a Gas Stream. J. T. Waber. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 96-169.
Analyses of processes such as ionic diffusion which occur in oxide films during high-temperature oxidation. Interrelationship between lattice defects, ionic conduction and oxidation. Behavior of various metals. 69 ref. (R1h, Ni)

431-R. (English.) **The Sulphiding of Mild Steel Surfaces.** M. R. Piggott and H. Wilman. *Acta Crystallographica*, v. 11, Feb. 10, 1958, p. 93-97.
Electron diffraction studies of reactions of mild steel with sulphur, and with hydrogen sulphide. All the known forms of iron sulphide were formed under characteristic conditions. In addition a previously unknown cubic iron sulphide was observed. It appears to have a structure analogous to that of y-Fe_2O_3. 7 ref. (R7k, M22h; ST)

432-R. (French.) **Behavior of Coatings in Association With Cathodic Protection.** B. Raclot. *Métaux Corrosion-Industries*, no. 391, Mar. 1958, p. 108-114.
Cathodic anticorrosion method is rarely used without some preliminary surface treatment and the behavior of the surface treatment must be studied in association with the cathodic protection. Results of a study in which the current density giving the protective potential is determined for a steel U tube with bituminous coating immersed in a saturated sodium chloride solution. Possibility of surface blisters presents a major problem. (R10d, L26a)

433-R. (German.) **Corrosion in Building Materials.** S. Baker and E. Carr. *Bitumen-Teere Asphalte-Peche und Verwandte Stoffe*, Mar. 1958, p. 82-83.
(R3, T26n)

434-R. (German.) **Factors Inhibiting Corrosion and Their Special Application.** Karl-Hermann List. *Erdol und Kohle*, v. 11, Feb. 1958, p. 86-88.
(R10b)

435-R. (German.) **Oxidizing Speed of Titanium in Fused Salt and the Joining of the Oxidized Products.** M. E. Straumanis and Ch. Chiou. *Zeit-*

schrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie, v. 62, no. 2, 1958, p. 201-209. (R6j, R1h; Ti)

436-R.* Corrosion-Resistance of Spheroidal-Graphite Iron. F. L. LaQue. *Foundry Trade Journal,* v. 104, June 12, 1958, p. 711-714.

Galvanic behavior; resistance to acid corrosion; corrosion by sea water; atmospheric corrosion; underground corrosion. (R-general; CI-r)

437-R. Rate of Oxidation of Copper in Nitric Acid. N. N. Milyutin and A. I. Shultin. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 57-60. (Translation by Consultants Bureau, Inc.)

Increase of temperature greatly increases the oxidation rate of Cu without affecting the linear relationship between the logarithm of the oxidation rate and the potential. The step which determines the oxidation rate is the electrochemical reaction at the Cu surface at moderate nitric acid concentrations, and probably the diffusion of oxidant to the surface at nitric acid concentrations above 11 molar. 9 ref. (R1h, R6g; Cu)

438-R.* Iridium as a High-Temperature Material. F. D. Richardson. *Platinum Metals Review,* v. 2, July 1958, p. 83-85.

Iridium crucibles were completely resistant to attack by Pb at 1000 to 1500° C. The crucibles lost weight slightly during use and became etched in appearance, whether they held slags or metal. The metal grains so revealed ranged up to 1 mm. across. Typical losses of Ir were: 0.0002 g. into 18 g. lead in 444 hr. at 1000° C.; 0.0014 g. into 20 g. slag and 20 g. lead in 144 hr. at 1000° C. 6 ref. (R6m; Ir, Pb)

439-R.* Behavior of the Platinum Metals at High Temperatures. A. R. Powell. *Platinum Metals Review,* v. 2, July 1958, p. 95-98.

Behavior of Pt, Rh and Pd in oxygen at high temperatures. Pt is the most, and Pd the least, volatile up to 1200° C., whereas at 1300° C. there is relatively little difference in the volatility of all three. The volatility of Pt in oxygen at 900-1100° C. is appreciably reduced by alloying it with Pd or Rh. 9 ref. (R1h, 2-62; EG-c)

440-R.* Corrosion of Mild Steel in Alkaline Pulping Liquors. Pt. 1. Kraft White Liquor. Richard B. Kesler and James F. Bakken. *Tappi,* v. 41, Mar. 1958, p. 97-102.

The effect of the presence of appreciable quantities of sodium chloride, sodium sulphate and sodium carbonate in kraft white liquor on the corrosion rate of mild steel in white liquor. 11 ref. (R7p, T29R; CN)

441-R. A Basic Study of Corrosion of Magnesium. R. R. Addiss. Cornell University. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131662, Dec. 1957, 57 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.50.

Structure of the surface; process of formation and structure of surface films appearing during corrosion. Attempts to obtain a perfectly clean surface, both by cleaning a contaminated surface and by producing a new, clean surface in vacuum. Studies of oxidation of surfaces covered with the "first film", aimed at measuring the oxidation rate and investigating the relative crystallographic orientation of the metal and the oxide. (R-general; Mg)

442-R.* (German.) **Investigation of Sulphur Attack on Nickel and Nickel Alloys.** Irmtraud Pfeiffer. *Zeitschrift für Metallkunde,* v. 49, May 1958, p. 267-275.

Kinetics of sulphurizing reaction at 620°. Rate of sulphide formation is dependent on alloying additions. Microscopic study of sulphide layers; intercrystalline corrosion. (R7k, 2-60; Ni)

443-R.* (Italian.) **Electron Microscopic Examination of Oxide Film Formed on Aluminum by Hot Oxidation.** M. Paganelli. *Alluminio,* v. 27, Apr. 1958, p. 159-164.

Film formed on Raffinal annealed at about 620° C. is gamma Al_2O_3, cubic spinel. Under microscope this film presents a pseudo-radiated structure. Hot oxidation figures are true corrosion figures composed of pits having walls parallel to planes (100) of Al. 11 ref. (R1h, M27; Al)

444-R.* (Japanese.) **Aluminum and Aluminum Alloys in the Wine and Brandy Industry. Pt. 2. Corrosion of Aluminum Alloys in Alcohol and Acid Solution.** Morinaga Takuichi, Zaima Shigeo and Kagami Motoo. *Light Metals,* no. 30, May 1958, p. 26-33.

Specimens are dipped in alcohol diluted nearly equal to the alcohol concentration of raw brandy (or wine) and corrosion resistance examined. Specimens are next dipped in acid solution equal to the total acidity of raw brandy (or wine) and examined. Experiment was repeated for a mixed solution of alcohol and acid. 8 ref. (R7f; Al)

445-R.* (Japanese.) **Oxidation of Titanium-Iron Alloys in Air at High Temperatures.** Morinaga Takuichi, Miura Ishi and Takaai Tetuya. *Light Metals,* no. 30, May 1958, p. 42-52.

Investigated by measuring the weight change due to formation of oxidation layers. Specimens were Kroll Ti, 1% Fe, 2% Fe, 4% Fe and 8% Fe alloys heated in air at 600, 700, 800 and 900° C. The parabolic rate law was applicable to the oxidation of Kroll Ti and Ti-Fe alloys in the range 600-900° C. Activation energies were calculated. (R1h, 2-62; Ti-b, *Fe*)

446-R.* **Theory and Practice of Boiler Water Treatment as a Means of Eliminating Corrosion and Scale.** E. Quaade-Holm. *Corrosion Technology,* v. 5, July 1958, p. 213-214, 237.

An organic compound of high molecular weight not only eliminates scale-forming compounds, but removes old scale. The scale is physically removed rather than chemically decomposed. (R4c, R10b)

447-R.* **Magnetic Treatment of Liquids for Scale and Corrosion Prevention.** Theo Vermeiren. *Corrosion Technology,* v. 5, July 1958, p. 215-219.

Use of permanent magnetic field through which the water supply passes inhibits corrosion by transforming ferric hydroxide into magnetite, and causes dissolved minerals to remain in solution rather than to be deposited as scale. (R10g)

448-R.* **Water Treatment for Domestic Hot-Water Supplies.** C. C. Hanson. *Corrosion Technology,* v. 5, July 1958, p. 220-224.

Process using sodium calcium hexametaphosphate to prevent scale and corrosion. 5 ref. (R10b)

449-R.* **Galvanic Corrosion.** J. Boraston. *Inspection Engineer,* v. 22, May-June 1958, p. 50-56.

Causes, prevention of dissimilar metal corrosion, crevice corrosion, stay current corrosion. 4 ref. (R1a)

450-R.* **The Effect of Surface Finish and Galvanic Coupling on the Corrosion Resistance of ASTM A-212 Carbon Steel in Primary and Secondary Water.** L. R. Scharfstein. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 52-57.

Neither surface finish nor galvanic coupling has any appreciable effect on corrosion resistance of carbon steel under reactor operating conditions. (R4c; CN)

451-R.* **Corrosion of Shield Tank Materials in Lithium Chromate Solutions.** E. Rau and K. Jakobson. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 58-65.

Corrosion of shield tank materials (carbon steel, copper and lead) investigated in an inhibiting solution of lithium chromate. Standard test coupons and some soldered couples were tested in lithium chromate solution (1630 ppm.) with different pH values. Results indicate that the solution is effective for at least six months. (R10a; Cu, Rb, ST)

452-R. **Copper Alloys for Corrosion Resistance.** R. V. L. Hall. *Chemical Engineering Progress,* v. 54, June 1958, p. 51-55.

Combination of Cu alloys with ferrous or other alloys as duplex tube or clad components has excellent corrosion-resistant properties. (R-general; Cu-b)

453-R. **Costly Liquid Chlorine Corrosion Overcome by Zirconium.** *Chemical Processing,* v. 21, July 1958, p. 108-109.

(R6q; Zr)

454-R.* **Thin Metal Film Corrosion Indicators.** David Roller. *Corrosion,* v. 14, June 1958, p. 263t-267t.

Evaluates effectiveness of thin continuous iron films vacuum deposited on borosilicate glass and Plexiglass 55 in thicknesses ranging from 100 to 2500 Å, as corrosion indicators by tests made in atmospheres varying from 0 to 100% relative humidity; change in electrical resistance and visual appearance with corrosion. 8 ref. (R11a, Fe, 14-62)

455-R. **Development of the Redox Probe Field Technique.** F. E. Constanzo and R. E. McVey. *Corrosion,* v. 14, June 1958, p. 268t-272t.

Field technique developed to obtain oxidation reduction potentials of soils through use of probe. Compares Redox data to other standard corrosion criteria. (R8)

456-R.* Corrosion Resistance of Five Stainless Alloys in Nitric Acid Containing Chloride. I. I. Tingley. *Corrosion,* v. 14, June 1958, p. 273t-274t.

A number of stainless steels and the new alloy Ni-O-nel were tested in solutions 8N in HNO_3 and 0.2N in chloride. Stainless steels type 304L, 316, 309SCb and 329 were all resistant to the liquid and hot vapor, only type 329 showed good resistance to the condensing vapors from these solutions. The resistance of this steel was about 1000 times as great as that of type 304L, 316 and 309SCb. (R6g; SS)

457-R.* Laboratory Testing of Railroad Diesel Cooling System Corrosion Inhibitors. J. I. Bregman and D. B. Boies. *Corrosion,* v. 14, June 1958, p. 275t-279t.

Results of flask type and recirculating tests with several commercial and experimental corrosion inhibitors; effect of coupling between various metals, inhibitor dosage level, water composition and antifreeze. (R4, R10b, R11h)

458-R.* Inhibition of Corrosion of Steel by Tetramethylammonium Bromide. Rudolph Macy, B. L. Harris, W. C. Bull and J. W. Eastes. *Corrosion,* v. 14, June 1958, p. 280t-282t.

Data on effectiveness of tetramethylammonium bromide and hexamine in inhibiting corrosion of steel by mustard, bis (2-chloroethyl) sulphide. Effect of inhibitor on rate of decomposition of mustard at 150° F. 11 ref. (R10f; ST)

459-R.* Inhibition of Titanium in Fuming Nitric Acid. J. B. Rittenhouse and C. A. Papp. *Corrosion,* v. 14, June 1958, p. 283t-284t.

Specimens of commerically pure Ti in Ti alloy containing 8% Mn were exposed to fuming nitric acid in tests at 30° C. of 28 days' duration in which a vapor space in the storage vessel contained varying amounts of oxygen. Results indicated no inhibition of titanium corrosion by oxygen but confirmed inhibiting effect of water at 1 to 2% by weight in fuming nitric acid. 4 ref. (R6g, R10b; Ti, *Mn,* O)

460-R.* Laboratory Studies Relating Mineral Quality of Water to Corrosion of Steel and Cast Iron. T. E. Larson and R. V. Skold. *Corrosion,* v. 14, June 1958, p. 285t-288t.

Influence of combination of various normal mineral constituents in domestic waters on rate of corrosion of cast iron and steel and on accumulation of corrosion products. Tests with air-saturated waters at room temperature with velocities of 0.1 to 1.0 ft. per sec. with pH control by CO_2 at 6.0 to 8.5. Ions considered include chloride, sulphate, bicarbonate and calcium. 6 ref. (R4, R11; CI, ST)

461-R. The Current-Voltage Relationship of Galvanic Anode Arrays in Cathodic Protection. L. J. Waldron and M. H. Peterson. *Corrosion,* v. 14, June 1958, p. 289t-294t.

Arrays of impressed current steel anodes of five different anode sizes and a steel sea wall acting as a cathode were used in investigating current outputs. Determined output current for driving potentials of 0.1, 0.2, 0.5, 0.7 and 1.0 volts between cathode and anode arrays. (R10d)

462-R.* Accelerated Condensation Corrosion Test for Evaluating Rust Preventives. E. A. Dieman and J. W. Gaynor. *Corrosion,* v. 14, June 1958, p. 302t-304t.

Apparatus and procedure employed in accelerated condensation corrosion test for evaluating effectiveness of rust preventives. Cooling to increase condensation on steel test panels and panel preparation procedure involving water treatment; decreased testing time and increased precision compared to results obtained in JAN-H-792 humidity cabinet tests. 5 ref. (R10b, R11k; ST)

463-R. Use of Magnesium Anodes to Protect Steel Mains. Harold C. Boone. *Corrosion,* v. 14, July 1958, p. 307t.

(R10d; 4-60, ST)

464-R.* The Activation and Inhibition of Corrosion of Metals by Metallic Cations. W. Roger Buck and Henry Leidheiser. *Corrosion,* v. 14, July, 1958, p. 308t-312t.

Survey of the corrosion by fruit and mineral acids at the boiling point in the presence of low concentrations of foreign metallic ions. Cations of the elements in groups II through V in the periodic table showed the highest tendency to decrease the rate of corrosion and the transition elements in group VIII showed the highest tendency to increase the rate of corrosion. 6 ref. (R6g, R7g, 2-66)

465-R.* Aqueous Corrosion of Uranium Fuel-Element Cores Containing 0 to 20 Weight Percent Zirconium.

Daniel R. Grieser and Eugene M. Simons. *Corrosion,* v. 14, July 1958, p. 313t-318t.

Design and operation of a windowed autoclave system employed in the study of corrosion by pressurized hot water. The device has been used to obtain time-lapse motion pictures of the swelling and rupture of deliberately defected zirconium-clad uranium specimens. A method is described by which corrosion rates were calculated from pressure and temperature measurements. (R4, R11h; U, Zr)

466-R.* Inter Society Corrosion Committee Glossary of Corrosion Terms. Pt. 2. *Corrosion,* v. 14, July 1958, p. 319t-320t.

(R-general; 11-67)

467-R.* The Behavior of Steels in Hydrogen Sulfide Environments. L. W. Vollmer. *Corrosion,* v. 14, July 1958, p. 324t-328t.

Spontaneous cracking of steels in deep high-pressure condensate wells producing gas containing hydrogen sulphide. The susceptibility of most constructural steels to sulphide-stress cracking can be minimized, if not eliminated, by appropriate heat treatment which must include tempering at a temperature not less than 1150° F. and by limiting the maximum mechanical properties to predetermined levels. 11 ref. (R1d, R7k; ST)

468-R.* Surface Area Relationships in Polarization and Corrosion. Milton Stern. *Corrosion,* v. 14, July 1958, p. 329t-332t.

Polarization behavior of surfaces containing regions which exhibit different overvoltage parameters for the same reaction. The effect of cathode area fraction on corrosion potential and corrosion rate is considered for a corroding surface controlled by activation polarization. It is shown that the corrosion potential and corrosion rate are most sensitive to area changes when the surface is largely cathode or anode. 5 ref. (R1a)

469-R.* Cathodic Protection of Radiant Heating Pipes. L. C. Wasson. *Corrosion,* v. 14, July 1958, p. 333t-336t.

(R10d; 4-60)

470-R.* Service Performance of Cast Magnesium Alloy Anodes. G. L. Christie. *Corrosion,* v. 14, July 1958, p. 337t-340t.

Designs tested included sand cast cylindrical anodes with cast-in steel conductor rods, which corroded in a very uniform pattern, and chill cast rectangular anodes with cast-in retaining straps, which corroded preferentially at the cast-in straps. The Mg alloy used in all cases was AZ-63. Chemical analysis of the metal indicates that the only major difference in the two anodes is inverse segregation of the major alloying constituents in the chill cast anodes. (R10d; Mg-b, 17-52)

471-R.* Corrosion of Steel in Water by Varied Ratios of Dissolved Gases. J. Wade Watkins and G. W. Kincheloe. *Corrosion,* v. 14, July 1958, p. 341t-344t.

Tests were conducted with varied ratios of free carbon dioxide to both oxygen and hydrogen sulphide. Corrosion rate as a function of time in the system was determined at time intervals to a maximum of 984 hr. exposure. Corrosion caused by oxygen and free carbon dioxide increased almost in direct proportion to the concentration of dissolved oxygen. 5 ref. (R4, 2-66; ST)

472-R.* Mechanism of Inhibiting Effect of Hydrofluoric Acid in Fuming Nitric Acid on Liquid-Phase Corrosion of Aluminum and Steel Alloys. David M. Mason and John B. Rittenhouse. *Corrosion,* v. 14, July 1958, p. 345t-350t.

Inhibiting effect of hydrofluoric acid is found to be dependent primarily on the formation of a tenacious insoluble fluoride compound of Al or Fe, respectively, on the surface of the metal. This mechanism is discussed in relation to solubility data for several pertinent compounds; analysis of passivating coating on metal samples; correlation of solubility data with extent of corrosion of metal. 5 ref. (R6g, R10b; Al-b)

473-R.* The Corrosion Resistant Properties of Zirconium. Pt. 2. F. G. Cox. *Corrosion Prevention and Control,* v. 5, June 1958, p. 46-48.

Summarizes resistance of Zr to liquid Bi, Bi-In-Sn eutectic, Bi-Pb eutectic, Bi-Pb-In eutectic, Ga, Li, Hg and Na. Galvanic corrosion and corrosion by gases. 8 ref. (R1a, R6m; Zr, *Bi, In, Pb, Ga, Hg, Na*)

474-R. Atmospheric Corrosion of Metals at Low Temperatures. A. A. Dychko and K. A. Dychko. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 261-267. (Translation by Consultants Bureau, Inc.)

A critical temperature of —25° has been found, below which atmospheric corrosion of metals is sharply retarded. The probability of chemical action on metal surfaces is decreased, because the absolute humidity of atmospheric air decreases with fall of temperature; moisture is deposited from the air in the form of hoarfrost and snow, which are less corrosive than water toward metals; rapid, relative moist corrosion passes into slow, relatively dry corrosion; atmospheric air has a lower content of the components which have an active influence on metal corrosion. 9 ref. (R3, 2-63)

475-R. (Japanese.) **Blackening of Stainless Steel.** R. Higashiumi. *Metals,* June 1958, p. 434-436.

The formation of black films by chromic acid oxidizing, electrochemical oxidizing, sulphidization and low-temperature oxidizing. (R1h; SS)

476-R.* **Van de Graaff Study: Second Interim Report on the Deposition of Corrosion Products Under Irradiation.** G. P. Simon, B. G. Schultz and Y. Solomon. *Bettis Technical Review,* WAPD-BT-7, Mar. 1958, p. 43-51.

Van de Graaff studies to determine what variables are involved in the phenomenon of preferential deposition of crud on fuel element surfaces. Previous work indicates that irradiation at freshly formed corrosion products causes a marked increase in the amount of deposition. Additional work indicates that the release rate and the amount of deposition vary inversely with pH. (R2b, 2-17)

477-R.* **Watch Out for Stress Corrosion in Metals.** E. H. Phelps. *Product Engineering,* v. 29, Aug. 4, 1958, p. 56-58.

Stress in certain chemical environments leads to intergranular and transgranular corrosion. Design principles to avoid this corrosion. (R1d; 3-66)

478-R.* (French.) **High-Temperature Corrosion by Water of Very Pure Aluminum Crystals.** Jean Herenguel and Pierre Lelong. *Comptes Rendus,* v. 246, Apr. 28, 1958, p. 3481-3484.

Variable grain growth in Al monocrystals proceeds according to crystal orientation and is associated with speed of corrosion and appearance of pits. A homogeneous, compact film is formed, followed by pitting. In some areas pits do not form; instead, depressions similar to surface undulations of Zr are noted. (R4a; 2-62, Al)

479-R.* (French.) **Research on Dry Corrosion. Oxidation of Lead Pellets.** Haidun N. Terem. *Faculte des Sciences de l'Universite d'Istanbul, Revue,* v. 22, Oct. 1957, p. 343-352.

Tiny pellets can be heated above melting point of lead without changing shape. Prior to heating, specimens were cleaned and sized with emery paper and others were further cleaned in solution of nitric acid. Oxidation of Pb at any temperature obeys parabolic law. Minimum of oxidation indicated by Gruhl in zone of crystallographic transformation of lead oxide is confirmed. An induction period is observed at 535° C., which partially confirms parabolic results obtained by Weber and Baldwin. Granting that oxidation develops at different speeds under 475 and over 530°, corresponding activation energies approach 6900 and 23,000 cal. 13 ref. (R1h; Pb, 6-67)

480-R.* (French.) **Corrosion of Iron in General and of Concrete Reinforcement in Particular.** M. Berthier. *Revue de Materiaux,* no. 511, Apr. 1958, p. 101-105.

Corrosion viewed as risk to be dealt with before occurrence; theory of passivation of iron; passivation techniques, use of low-solubility salts such as phosphates and fluorides. 3 ref. (R10c; Fe)

481-R.* (French.) **Study of the Corrosion Resistance of Nodular Cast Iron.** Irina Cornea. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 63-71.

Resistance to corrosion by hydrochloric acid of nodular cast iron is nearly twice as great as that of gray cast iron of similar composition and microstructure. This supports hypothesis that nodular cast iron in oxygen-free acid mediums should have better resistance than gray cast iron because of the smaller ratio of cathodic to anodic areas of nodular cast iron as compared with gray cast iron, the corrosion rate, in the presence of hydrogen depolarization, being determined by the ratio of cathodic to anodic areas. 4 ref. (R1, R6g; CI-r)

482-R.* (Russian.) **New Acid Resistant Nodular Iron.** Z. B. Shapiro. *Liteinoe Proizvodstvo,* no. 5, May 1958, p. 24-26.

Development of corrosion resistant iron with 3% C, 3% Si, 1% Mn, 2.2% Cr, 17.5% Ni and 8.5% Cu for use in automobile motor cylinder block. (R6g, T21b; CI-r)

483-R. Cavitation Resistance of Electrodeposited Chromium. M. G. Timerbulatov and V. E. Khromov. *Vestnik Mashinostroeniya,* v. 38, no. 2, 1958, p. 56-58. (Henry Brutcher, Altadena, Calif., Translation no. 4212.)

Index of cavitation resistance is loss of weight of specimens exposed to vibration with a magnetostrictional vibrator in a liquid. Setup for plating the specimens, correlation between cavitation resistance and Vickers hardness of Cr plates. Factors involved in cavitation resistance such as type of plate (dull vs. bright); thickness, porosity, brittleness and residual stress state of plate; hardness of basis metal. Cavitation resistance is improved by Cr deposits. (R2m, Q29c; *Cr,* 8-62)

484-R.* Action of Alternating Current on Corrosion Process of Iron. Yutaka Torigoe. *Electrochemical Society of Japan, Journal,* v. 28, 1958, p. E-30-E-33.

The effect of alternating current on the local cells on iron in a given corrosive environment is determined by the impressed potential, the polarization characteristics of the local anode and cathode and the magnitude of alternating current applied. (R1j; Fe)

485-R. Corrosion and Water Treatment. G. G. Sindery. *Corrosion Technology,* v. 5, July 1958, p. 209-212, 224.

Water treated for a specific industrial use may or may not be satisfactory from a corrosion standpoint. If not, it must be treated appropriately. (R4a, R10b)

486-R. The Formation of Crystalline Anodic Oxide Films on Beryllium. M. L. Levin. *Faraday Society, Transactions,* v. 54, June 1958, p. 935-940.

In 1 and 10% aqueous solutions of nitric acid and in a nitric + chromic acid solution the anodic films on electropolished polycrystalline Be are found to be always crystalline. In ammoniacal ethylene glycol, a nonaqueous electrolyte, the anodic film is amorphous. 15 ref. (R1h; Be)

487-R. (English.) **Passivity Induced by Chemical Surface Treatment.** K. S. Rajagopalan and K. S. G. Doss. *Naturwissenschaften,* Dec. 1958, p. 631.

(R10c)

488-R.* (French.) Alloy Steels Resistant to Stress Corrosion in Presence of Hydrogen Sulphide. P. Bastien, H. Veron and C. Roques. *Revue de Métallurgie,* v. 55, Apr. 1958, p. 301-317.

Study of Cr-Mo-V steels. Tests revealed that hydrogen embrittlement decreases in proportion to decreasing elastic limit, while interval before rupture increases; cold working has favorable effect, as does high Cr content. Heat treatment was developed for piping made of this type of alloy for use at natural gas installation where hydrogen sulphide is problem. 10 ref.
(R1d, R7k, Q26s; SS, *Cr, Mo, V*)

489-R. (French.) **Electrochemical Study of the Corrosion of Stainless Steels.** J. M. Defranoux. *Societe Francaise des Electriciens, Bulletin,* v. 8, Mar. 1958, p. 174-181.

7 ref. (R11m; SS)

490-R. (German.) **Passivity of Metals.** H. Gerischer. *Angewandte Chemie,* May 21, 1958, p. 285-298.

86 ref. (R1a)

491-R. (German.) **Problems of Materials and Corrosion in Reactors With Liquid Metal Cooling Media.** Willibald Machu. *Atomkernenergie,* Mar. 1958, p. 97-100.

(R6m, T11p)

492-R. (German.) **Alternate Immersion Tests in Cast Iron and Steel Plates With Reference to Corrosion in Day-Shafts.** Werner Sardemann. *Glueckauf,* Mar. 1, 1958, p. 338-345.

(R11g; CI, ST, 4-53)

493-R. (German.) **Corrosive Action of Synthetic Materials on Metals.** E. P. Weissler. *Kunststoffe,* May 1958, p. 213-216.

(R7p)

494-R. (German.) **Corrosion of Metallic Material and Metallic Coatings in Industrial Atmospheres.** Gerhard Schikorr. *Schweizer Archiv,* Feb. 1958, p. 33-46.

78 ref. (R3n)

495-R. (German.) **Corrosion Protection Through "Passivation".** Hans Hebberling. *VDI-Zeitschrift,* v. 100, May 1, 1958, p. 565-566.

(R10c)

496-R.* (German.) **Corrosion Behavior of Magnesium During Inhibition and Activation of Its Dissolution Represented in a Corrosion-Current pH Diagram.** T. Markovic and L. G. Rubinic. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 357-359.

Conversion of the corrosion current into the conventional unit g. per sq. m. per day was carried out for an Mg electrode of 25 sq. cm. geometrical surface. Behavior of Mg after addition of activators and passivators showed that KF both accelerates and retards corrosion, depending on pH of the acid. 15 ref. (R10b, R10c; Mg)

497-R. (German.) **Cathodic Protection of Ship Hulls.** R. Juchniewicz. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 360-368.

Exhaustive suvey of sea water corrosion at Technological University, Gdansk. 36 ref. (R4b, R10d, T22g)

498-R. (German.) **Behavior of Cast Iron in Acids With and Without Inhibitors.** Willibald Machu and M. G. Fouad. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 369-379.

In acids and their mixtures, effect of inhibitors is independent of the nature of their charge. Losses of weight caused by mixtures are not equal to the algebraic mean of those of the individual acids, owing to modification of hydrogen ions and anions. Organic and inorganic inhibitors behave alike. Phosphate ions of phosphoric acid act as inhibitors. Carbides and silicides in the surface of the cast iron reduce inhibition. Structure of inhibitor film as well as solubility and resistance of surface film determine degree of inhibition. 7 ref.
(R6g, R7b, R10b; CI)

499-R. (German.) **Cathodic Polarization of Active Chromium and Chromium-Iron Alloy in Sulphuric Acid.** Th. Heumann and B. Röschenbleck. *Werkstoffe und Korrosion,* v. 9, June 1958, p. 383-390.

Cathodic polarization curves and rest potentials were measured with respect to pH of the electrolyte. Behavior of rest potential deviates from that of the hydrogen electrode. In the range of pH values investigated, cathodic polarization curves of the deposition of hydrogen are parallel. Exchange currents rise with increasing acid concentration and increasing Cr in the alloy. 15 ref. (R1a, R6g; Fe, Cr)

500-R. (German.) **Current Density and pH-Dependence of Electrochemical Structure and Decomposition of Layers of Oxide on Pt, Pd, and Au.** K. J. Vetter and D. Berndt. *Zeitschrift für Elektrochemie,* v. 62, no. 3, 1958, p. 378-386.

17 ref. (R1h; Au, Pd, Pt)

501-R. (German.) **Investigation of Kinetics of Scaling of Titanium in Water Vapor Using a New Volumetric Method.** K. Loehberg and H. W. Schleicher. *Zeitschrift für Physikalische Chemie,* v. 15, Apr. 1958, p. 223-224.

19 ref. (R3, R11q; Ti)

502-R. (Japanese.) **Study of Corrosion Due to Industrial Water.** N. Awa and Y. Yamamoto. *Research Institute of Technology, Nihon University, Journal,* v. 16, Dec. 1957, p. 272-276.

An iron plate immersed in industrial water corrodes very rapidly, this corrosion rate being approximately twice that of distilled water, well water or city water. Corrosion prevention methods are cathodic protection and addition of an inhibitor. (R10b, R10d, R4; Fe)

503-R. (Japanese.) **Effectiveness of Soap Additives and Cathode Protection Methods in Corrosion Prevention by Industrial Water.** N. Awa and Y. Yamamoto. *Research Institute of Technology, Nihon University, Journal,* v. 16, Dec. 1957, p. 278-280.

An iron plate immersed in industrial water may be protected against corrosion merely by connecting a circuit with a Zn plate, or by adding soapy water of 0.1 to 0.2% concentration. The anticorrosion effect will not be reduced when soapy solution is dried into soap films. (R10b, R10d, R4; Fe)

504-R.* **What You Can Do to Reduce Stress Corrosion.** Fred J. Poss. *Chemical Engineering,* v. 65, July 28, 1958, p. 140-144.

Follow established good design practices in fabricating and assembling high-temperature equipment; avoid dead ends and traps where liquid can stagnate; avoid rough handling since this sets up stresses; avoid chlorinated solvents for cleaning equipment; slowly heat or cool equipment to minimize stresses; keep all high-temperature lagging absolutely dry. (R1d)

505-R.* **Corrosion—Refesher on Cause and Cure.** Robert V. Jelinek. *Chemical Engineering,* v. 65, July 28, 1958, p. 114-115.

Mechanism of corrosion; types of corrosion encountered; economic loss due to corrosion. (R-general)

506-R. Corrosion Resitance of Adhesive Bonded Aluminum Panels. F. J. Riel, S. E. Susman and Beverly Stewart. *American Chemical Society, Preprint* 19, Apr. 1958, p. 125-130.

(R11j; Al-b, 7-58)

507-R.* Corrosion of Aluminum Die Castings. D. L. Colwell and R. J. Kissling. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 140-145.

Silicon alloys such as S5C and S12A have superior corrosion resistance and the Si-Mg alloy SG100A has inferior corrosion resistance. The common die-casting alloy SC84A has intermediate corrosion resistance. Iron beyond the 1.3% maximum now permitted for the cold chamber machine should be avoided for the best corrosion resistance. Zinc up to 2 or 2½% has no harmful effect on corrosion resistance. 7 ref. (R6g, Al-b, 5-61)

508-R. Protective Potentials of Metals. V. V. Gerasimov. *Bulletin of the Academy of Sciences of the USSR,* v. 3, 1957, p. 279-284.

A new method for calculating protective potentials is based on an exponential relationship between the rate of the anodic process of dissolution of metal and the potentials. 9 ref. (R10d)

509-R. Role of Hydrogenation in Corrosion Fatigue of Steel. G. V. Karpenko. *Academy of Sciences of the USSR, Proceedings,* v. 113, 1957, p. 219-221. (Translation by Consultans Bureau, Inc.)

4 ref. (R1e; ST, *H*)

510-R. (English.) Behavior of Structural Steel Subjected to Corrosion Fatigue. Shunzo Okamoto and Hideo Kitagawa. *Seventh Japan National Congress for Applied Mechanics, Proceedings,* 1957, p. 27-30.

(R1e; ST, SGB-s)

511-R. (Czech.) Study of Zinc Passivation With Tertiary Butanol Chromate in the Gas Phase. L. Cerveny, J. Nemcova and A. Hrbek. *Korose a Ochrana Materialu,* v. 2, no. 1-2, 1958, p. 1-6.

14 ref. (R10c, R7g; Zn)

512-R. (Czech.) Corrosion Resistance of Metals and Surface Treatment During Overseas Transport and in Tropics. K. Barton. *Korose a Ochrana Materialu,* v. 2, no. 1-2, 1958, p. 617.

(R3s, R4b)

513-R. (German.) Protection Against Corrosion in Cooling Water Circulation of Cars. Erich Caspers. *Eisenbahningenieur,* May 1958, p. 141-153.

(R10b, R4a)

514-R. (German.) Low-Temperature Corrosion in Oil-Fired Boilers. Maximilian Lang. *Energie,* v. 10, June 1958, p. 227-230.

(R4c, 2-63)

515-R. (German.) Corrosion Protection of Gas Pipes in Vienna, Austria. Franz Egerer. *Gas-Wasser-Wärme,* v. 12, May 1958, p. 93-97.

(R1a, R10d, T26r)

516-R. (German.) Application of Cathodic Corrosion Protection. Otto Bess. *Siemens-Zeitschrift,* v. 32, May 1958, p. 328-330.

(R10d)

517-R. (Japanese.) Acid Resistance of Iron-Silicon Alloys. J. Tashima. *Metals,* v. 28, June 1958, p. 437-440.

Relation of composition to acid resistance and mechanical properties. (R6g, 2-60; Fe, Si)

518-R. (Russian.) Cavitation of Condensate Pump Wheels and How to Overcome It. S. M. Tarashchaskii. *Vestnik Mashinostroeniya,* v. 38, June 1958, p. 25-26.

(R2m, W13d)

519-R. (Russian.) Corrosion Resistance of Aluminum and Aluminum Welds. M. N. Vitkovski and V. A. Maslov. *Zavodskava Laboratoriya,* v. 24, Apr. 1958, p. 429-430.

Use of solution of 10% nitric acid and 7 g. per l. sodium fluoride will greatly retard corrosion in 98% boiling nitric acid.
(R6g, R10b; Al-b, 7-51)

520-R.* Underground Corrosion. Pt. 1. Corrosion Mechanism of Metals in Soil. *Corrosion Technology,* v. 5, Jan. 1958, p. 5-9.

Bureau of Standards report on corrosion mechanism of metals in soil free of stray currents. Graphitization may decrease or accelerate the normal rate of corrosion; physical or chemical properties of the soil control the character of corrosion; pitting factors are roughly proportional to the ratio of the uncorroded areas. In well-aerated soils the rate of pitting, although initially great, falls off rapidly with time, whereas, in poorly-aerated soils, the initial rate scarcely falls off with time. Low-alloy steels have a greater pitting rate than the plain steel; however, as the exposure increases, the rate

of pitting of the alloy steels diminishes more rapidly than the plain steel. High-alloy steels, especially Cr and Ni, decrease the weight loss through the entire range. (R8)

521-R.* Corrosion of Iron in Hydrochloric Acid in the Presence of Inhibitors at Various Temperatures. Pt. 1. I. P. Anoshchenko. *Journal of Applied Chemistry of the USSR,* v. 30, Mar. 1957, p. 417-422.

Polarization curve method used to study effects of potassium bromide, urotropine, acridine and combinations of them, on electrode processes in the corrosion of iron in 6 N hydrochloric acid solution at various temperatures (20, 40, 60 and 80°). At elevated temperatures urotropine has a considerably stronger retarding effect on the cathodic reaction of solution of iron in the acid. (R6g, R10b; Fe)

522-R.* Corrosion of Iron in Hydrochloric Acid in the Presence of Inhibitors at Various Temperatures. Pt. 2. I. P. Anoshchenko. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 557-561.

Depolarization in pure 6 N hydrochloric acid solution at 20° is effected by more than 95% by discharge of hydrogen ions. The solution rate of iron in pure acid rises with the temperature in geometrical progression. Participation of oxygen in depolarization increases with increasing inhibiting action of additives has been confirmed. The greatest inhibiting effect at 80° is produced by a combination of urotropine, ecridine, potassium bromide and methyl alcohol. The corrosion rate of iron in acid increases exponentially with the reciprocal of the temperature. (R6g, R10b; Fe)

523-R.* What to Do About Corroding Isomerization Units. J. E. Mason, Jr., and C. M. Schillmoller. *Petroleum Refiner,* v. 37, July 1958, p. 103-106.

Under conditions of severe corrosion by HCl in refineries, either pure Ni or a Ni-Cr alloy offers best resistance, particularly if installed by inert gas welding. (R6g; Ni-b)

524-R.* (German.) Electrochemical Method for the Study of Corrosion. M. Pourbaix. *Schweisstechnik,* v. 12, June 1958, p. 71-83.

Thermodynamics of corrosion of metals and alloys in aqueous solutions as well as in contact with moist substances. 9 ref. (R4, R1, R11m)

525-R. Oxidation of Copper in Aqueous Potassium Dichromate-Sulphuric Acid Solutions. N. N. Milyutin and A. I. Shultin. *Journal of Applied Chemistry of the USSR,* v. 30, Mar. 1957, p. 367-372. (Translation by Consultants Bureau, Inc.)

(R1h; Cu)

526-R. Titanium Does a Fast Burn. *Chemical and Engineering News,* v. 36, Aug. 4, 1958, p. 36-37.

Titanium can oxidize very rapidly provided a fresh metal surface is formed to initiate the reaction. (R1h; Ti-a)

527-R. (German.) Significance of Flade-Potential in the Passivity of Iron in Alkaline Solutions. K. E. Heusler, K. G. Weil and K. F. Bonhoeffer. *Zeitschrift für Physikalische Chemie,* v. 15, Apr. 1958, p. 149-161.

36 ref. (R6j, R10c; Fe)

528-R. Steel Company Opens Corrosion Research Lab. *Industrial Laboratories,* Aug. 1958, p. 8-11.

Carpenter Steel Co., Reading, Pa. (R-general; ST)

529-R.* (Italian.) Investigation of the Anodic Behavior of Titanium. Pt. 1. Measurement of Anodic Voltages. Bruna Rivolta. *Metallurgia Italiana,* v. 50, May 1958, p. 173-180.

Influence of current density and temperature on anodic behavior of Ti in 0.5 N solutions of HCl, NaCl, H_3BO_3, NH_2HSO_3, KOH, Na_2S, NaF and $HClO_4$. For NaF solutions, influence of acidity was also studied by adding HF, HCl and H_2SO_4. In all cases, with exception of fluorhydric solutions, passivation of electrode and formation of protective films was noted. (To be continued.) 14 ref. (R6g, R10c; Ti)

530-R.* High Temperature Hydrogen Sulphide Corrosion in Commercial Sovaformer Units. Pt. 1. E. B. Backensto, R. D. Drew and J. N. Vlachos. *Corrosion Technology,* v. 5, Jan. 1958, p. 13-16, 21.

Hydrogen sulphide corrosion presents a problem in the Pt catalyst reforming which is used to produce the high-octane motor fuel. This corrosion can be minimized by the reduction of the hydrogen sulphide in the process stream, the use of Cr-Ni austenitic steels, and the protection of metals by aluminizing. 6 ref. (R9k, T29n; 2-62)

531-R.* Inhibition of the Corrosion of Aluminum in Alkaline Solutions.

J. Sundararajan and T. L. Rama Char. *Corrosion Prevention and Control,* v. 5, May 1958, p. 55-56.

Corrosion rates of sheets of Al alloys containing Fe, Cu and silica immersed in 0.2 to 0.6 normal sodium hydroxide at 32 to 60° C. for periods of 1 to 5 hr. Inhibitor efficiencies of agar-agar, gum acaciae, dextrin, glue or gelatin at concentrations of 2 to 20 g. per l. Agar-agar or gum acaciae at 10 g. per l. gave inhibitor efficiencies in the range of 80 to 90. 9 ref. (R10b, R6j, Al, *Cu, Fe, Si*)

532-R.* Platinum-Faced Titanium for Electrochemical Anodes. J. B. Cotton. *Platinum Metals Review,* v. 2, no. 2, Apr. 1958, p. 45-47.

Titanium is resistant to the passage of current into an electrolyte, but has low resistivity when a second metal makes contact with it. When Ti is used as an anode in salt water and an anodic current increased, the voltage required to force the current through the service film rises until, at the weakest point, the film breaks down and local corrosion ensues. If, however, a small piece of Pt foil or wire is spot welded to the Ti, most of the current passes out through the Pt and the Ti is uncorroded. (R10d; Ti, Pt)

533-R. Effect of Porosity on the Corrosion Rate of Anodic Coatings. L. I. Kadaner and A. Kh. Masik. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 839-842. (Translation by Consultants Bureau, Inc.)

The rate of corrosion of anodic coatings in electrolytes depends to a significant extent on their porosity. Increase of the thickness of an anodic coating leads, on one hand, to an increase of the corrosion rate owing to increasing physical heterogeneity, and on the other, to a decrease of the corrosion rate owing to decreased porosity of the coating. The effect of layer thickness on the corrosion rate is determined by the relative significance of these factors. 5 ref. (R-general, 8-78, 9-68)

534-R.* Corrosion of Cutlery. E. A. Oldfield and D. Sheppard. *Corrosion Technology,* v. 5, June 1958, p. 187-189.

Evaluation of quick acid test and prolonged 3% salt solution test for corrosion resistance of stainless steel. Compares laboratory test to results obtained for knives used under household conditions. Commonly used qualitative testing procedures; causes of low corrosion resistance, corrosion of packed cutlery and corrosion in service. 6 ref. (R3, R4, R10e, R11; SS)

535-R. "Corrosion Keys": Lead. Carl Hack. *Chemical Processing,* v. 21, Aug. 1958, p. 123, 125, 127.

Behavior of Pb in corrosive environments. (R-general; Pb)

536-R. Highly Aggressive Solutions Can't Hurt Zirconium Castings. *Chemical Processing,* v. 21, Aug. 1958, p. 141-146.

Pump impellers, 50 diaphragm valves and other items withstand conditions about as severe as could be encountered anywhere in chemical processing, preventing contamination as well as corrosion. (R-general, T29; Zr, 5-60)

537-R. Humidity Testing of Protective Finishes. H. Melrose and R. E. J. Shave. *Corrosion Prevention and Control,* v. 5, May 1958, p. 49-54.

Necessity for high degree of accuracy in control of temperature and relative humidity in achieving consistent condensation and reevaporation of moisture on specimens during accelerated corrosion testing. (R11k)

538-R. Boiler Corrosion and Its Alleviation by Feed Water Conditioning. Pt. 2. The Conditioning of Feed Water. Andrew Laird and N. Reast. *Corrosion Prevention and Control,* v. 5, May 1958, p. 57-62.

(R4c, R10a, T26q)

539-R. Plastic Coatings for Buried Pipes. W. D. Parker. *Corrosion Technology,* v. 5, June 1958, p. 179-180.

(R8, R10e; 4-60, NM-g33)

540-R. Relative Corrosion Resistance of Stainless Steels. *Welding Engineer,* v. 43, July 1958, p. 59.

(R-general; SS)

541-R. Corrosion Cracking of Brass Under the Action of a Cyanide Electrolyte. A. V. Shreider. *Journal of Applied Chemistry of the USSR,* v. 30, 1957, p. 836-838. (Translation by Consultants Bureau, Inc.)

Corrosion cracking of brass manifolds used for conveying liquid fuel. (R1d, R6j; Cu-n)

542-R. (Czech.) **Corrosion of Silver Articles.** Karel Komarek. *Casopis Narodniho Musea,* no. 2, 1955, p. 136-141.

Physico-chemical properties of Ag and causes of its corrosion in air and in the soil, are considered. In the air Ag reacts with H_2S, in the presence of oxygen, to form Ag_2S. Corrosion of Ag in the soil consists in the formation, on its surface, of a film of AgCl by interaction with solutions of NaCl in the presence of CO_2 and O_2. Formation of AgCl in the soil is promoted by soluble salts of Fe^2 ions. The coating of Ag_2S is removed from the surface of the Ag with KCN by converting Ag_2S to the soluble complex salt $KAg(CN)_2$. (R3, R8; Ag)

543-R. (Russian.) **Corrosion Resistance of Aluminum and Copper.** V. I. Avdeyeva, L. P. Povalyayeva and A. Ya. Shatalov. *Trudy Voronezhskogo Gosudarstvennogo Universitela,* no. 2, 1956, p. 79-80.

Rate of corrosion of pure Cu and Al in buffer solutions in the presence of 0-1.0 *N* Cl-ions, encompassing the pH range of 2-12. Cu showed minimum rate of corrosion at pH 10-11.0, depending upon Cl-ions; minimal rate of corrosion of Al was at a pH 7.0-7.5 irrespective of the Cl-ion content of the solution. (R4; Al-a, Cu-a)

544-R.* **Vapor Phase Corrosion Inhibitors. Pt. 2. Applications.** K. S. Rajagopalan. *Electrochemical Society, India Section, Bulletin,* v. 7, Apr. 1958, p. 37-43.

Mechanism of operation of vapor phase corrosion inhibitors; examples of applications in packaging. 17 ref. (R10b)

545-R. (Russian.) **Effect of Chromium and Antimony on the Corrosion of Wrought Iron.** I. M. Bokhovkin. *Trudy Arkhangilskovo Lesotekhnicheskovo Instituta,* v. 16, 1955, p. 56-62.

Corrosion of graphitized wrought iron alloyed with Cr and Sb in 1 *N* H_2SO_4 at 50° is greater than non-graphitized specimens. Maximum attack was observed by in iron containing 0.42% Sb, and is explained by the chemical reaction between Cr and Sb. In the absence of passivation the rate of corrosion is determined by the interatomic bonds in alloys.
(R6g, 2-60; Fe-m, *Cr, Sb*)

546-R.* **The Use of Magnesium for the External Cathodic Protection of Marine Vessels.** C. F. Schrieber. *Corrosion,* v. 14, Mar. 1958, p. 26-30.

Over-all hull, including stern area, may be protected by a distributed system of Mg anodes. Anode weight, optimum length and number of anode strings are related to anode life. Cost of cathodic protection on ships and maintenance cost for unprotected ships compared. 7 ref. (R4b, R10d; Mg)

547-R.* **Prevention of Localized Corrosion in Sulfuric Acid Handling Equipment.** G. A. Nelson. *Corrosion,* v. 14, Mar. 1958, p. 45-49.

Localized corrosion, usually deep grooves, is due to differences in carbide structure created during welding or hot riveting operations. Preventive measures include removing the objectionable zones by a normalizing heat treatment, preventing objectionable phases from forming, or covering the areas with other corrosion resistant materials.
(R6g, R10, T29m)

548-R.* **Stress Corrosion of Austenitic Stainless Steel in Geothermal Steam.** T. Marshall. *Corrosion,* v. 14, Mar. 1958, p. 59-62.

Geothermal steam contaminated with chlorides, hydrogen sulfide and carbon dioxide was used. Stress-corrosion cracking occurred readily in the aerated, superheated steam but not when air-free. Tests prove that the cathodic depolarizing action of oxygen is essential to the stress-corrosion mechanism. Five conditions must be satisfied simultaneously to have cracking of austenitic stainless steel by geothermal steam; therefore, failure to satisfy any one of these conditions will prevent attack. 20 ref.
(R4d, R1d; SS-e)

549-R.* (Czech.) **Oxidation of Fe-Al-C Alloys.** Miloslav Vkylicky, Bohumil Prenosil and Hanus Tuma. *Hutnicke Listy,* v. 13, 1958, p. 490-495.

Study of alloys with varying Al and C content in the range of 900 to 1050° C. In some alloys oxidation is characterized by formation of blisters resulting from warping of initial protective layer. Oxidation continued at greater rate on spot of blister formation. Metallographic examination indicated that warping of initial protective layer is caused by volume changes connected with transformation of epsilon phase to gamma phase. This transformation was conditioned during oxidation by reduction of Al content in the base material in proximity to the surface. 16 ref. (R1h; Fe, Al, C)

550-R. (Russian.) **Kinetics of Etching of Zinc Used in Printing by the Chemical Method.** A. N. Krestovnikov and S. S. Gastev. *Nauchneye Trudy Moskovskoe Poligraficheskogo Instituta,* no. 3, 1955, p. 135-142.

Rate of dissolution of sheet Zn used in the printing industry, in mixtures of HCl and HNO_3 (using 15, 10 and 5% by weight of each component in the mixture), by determination of loss in weight after 5 min. of etching. (R7b; Zn, 4-53)

551-R.* Corrosion and Protection of Galvanized Steel Transmission Tower Footings. J. D. Piper. *Corrosion,* v. 14, Mar. 1958, p. 19-25.

Although the potentials vary with the seasons, the condition of galvanized tower footings may be predicted by means of electrical potential measurements. While corrosion occurs near the water table on towers having footings in permanent moisture, serious corrosion occurred only on footings having a metallic connection to electropositive structures or having a direct contact with cinders and other coal products. Magnesium anodes provide protection for galvanized tower footings. 5 ref.
(R8, R10d, T26; ST, 8-65)

552-R.* A Reaction Rate Study of the Corrosion of Low-Hafnium Zirconium in Aqueous Hydrofluoric Acid Solutions. Tennyson Smith and George Richard Hill. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 117-121.

Zirconium dissolves readily in HF solutions leaving a smooth unpitted surface. The rate of dissolution is directly proportional to the ununionized HF concentration when studied over a temperature range of −78° C. using a radioactive tracer Zr^{95}. 9 ref. (R6g; Zr-b)

553-R.* Dissolution of Metals in Aqueous Acid Solutions. Pt. 2. Depolarized Dissolution of Mild Steel. A. C. Makrides and N. Hackerman. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 156-162.

Dissolution rates of mild steel cylinders rotated in 2*N* HCL solutions containing ferric chloride, benzoquinone, and tolu-p-quinone. Dependence of rate on depolarizer concentration, stirring velocity, temperature and surface roughness of the metal. At high velocities the dissolution rate depends linearly on velocity of rotation and on the roughness of the metal surface. 22 ref. (R6g; CN)

554-R.* (French.) **Contribution to the Study of the Corrosion Mechanism of Magnesium and One of Its Alloys.** Guy Gronoel. *Comptes Rendus,* v. 246, May 12, 1958, p. 2750-2753.

Study of pH-potential curves of electrodes of high-purity Mg and of Ga_3Zr immersed in solutions of hydrochloric acid. Tests were conducted to determine effect of initial concentration of solutions at temperatures ranging from 20 to 50° C., both in presence of air and in nitrogen atmosphere. Comparative measurements were made in absence of agitation and after violent agitation of solutions, particularly in area contiguous to electrode. Films formed were studied by micrographic and radiocrystallographic means. (R6g, 2-66; Mg)

555-R. Effect of Cathodic and Anodic Polarization on the Rate of Corrosion Cracking in Stainless Steel. V. V. Romanov and V. V. Dobrolyubov. *Metallovedenie i Obrabotka Metallov,* July 1958, p. 19-21. (Henry Brutcher, Altadena, Calif., Translation no. 4277.)

Cathodic polarization retards and can fully stop corrosion cracking. Anodic polarization, on the other hand, speeds the process. Polarization has an effect on the character of corrosion cracks, on their shape and form of development. Increase in temperature raises the strength of the protective cathodic current, while the acceleration of the influence of anodic polarization was attained under much lower temperatures. 7 ref. (R1d, 2-61; SS)

556-R. Selective Oxidation Due to the Heating of the Evaporated Film of Alpha-Brass. N. Takahashi and K. Mihama. *Electron Microscopy, Proceedings of the Stockholm Conference,* Sept. 1956, p. 322-324.

A single crystal of alpha-brass is subjected to oxidation. Formation, crystal structure of CuO and ZnO studied. 8 ref.
(R1h; M21e, Cu-n, 14-61)

557-R. Corrosion Preventive Additives. Armour Research Foundation. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131459, Mar. 1952, 120 p. $3.

New corrosion inhibitors to supplement or replace petroleum sulphonates as lubricant additives.
(R10b, NM-h)

558-R.* Corrosion Rates in Port Hueneme Harbor. Carl V. Brouillette.

Corrosion, v. 14, Aug. 1958, p. 352t-356t.

Sixteen metals and alloys were immersed for 30 months in the sea water at Port Hueneme, Calif. Lead was least, while Mg alloys were most readily attacked. Pitting was major factor in corrosion of Al, stainless steel and Monel.
(R2j, R4b, 2-60; Al-b, Cu, Ni, Pb. CN-g, SS-c)

559-R.* Corrosion Problems in the Manufacture of Phosphoric Acid From Elemental Phosphorus. J. C. Barber. *Corrosion,* v. 14, Aug. 1958, p. 357t-362t.

Material used in construction of equipment. Corrosion rates for Type 316 stainless steel exposed to phosphoric acid at different temperatures. Relative corrosion resistance of 11 other alloys compared to Type 316. 18 ref.
(R6g, T29m, 17-57, 2-61; SS)

560-R.* Weather Versus Cathodic Protection of Underground Pipe Lines. F. E. Costanzo. *Corrosion,* v. 14, Aug. 1958, p. 363t-368t.

Comparison between weather data and cathodic protection survey data of a four-mile section of a 20-in. bare pipe line in southwestern Pennsylvania over a period of five years. Relationship between rectifier current output and rainfall, soil temperature and mean daily temperature. Temperature has little effect while precipitation of more than ½ in. makes definite change in cathodic protection current requirement. 6 ref. (R10d, T26r; ST)

561-R.* The Present Status of the Oil Ash Corrosion Problem. *Corrosion,* v. 14, Aug. 1958, p. 369t-372t.

Five case histories involving failures in the field are reviewed. Proposed solutions include the use of inhibitors, changing alloy composition, lowering operating temperature and altering composition of the oil. 17 ref. (R6p, R7d; Cr, Fe, Ni)

562-R.* Zinc as a Cathodic Inhibitor. Hans B. Jonassen. *Corrosion,* v. 14, Aug. 1958, p. 375t-376t.

Zinc in close contact with Ag furnishes Zn ions to an aqueous solution. A binuclear Zn hydroxide cation seems to be formed which can act as a cathodic inhibitor. This ion also acts as a buffer removing CO_2 and it reacts with oxygen put in the water to give additional hydroxide ions. 11 ref. (R10d; R4, Fe, Zn)

563-R.* An Eddy Current Gauge for Measuring Aluminum Corrosion. W. E. Ruther. *Corrosion,* v. 14, Aug. 1958, p.. 387t-388t.

Alternating current bridge measurement of impedance of a coil containing a corroded Al specimen may be directly converted to average metal loss per sq.cm. Results of dynamic aqueous corrosion tests at 260° C. using this method. 6 ref. (R11h, R4, X1c; Al-b)

564-R.* Observations on Corrosion Resistance of High Strength Stainless Steels for Aircraft. John Halbig and O. B. Ellis. *Corrosion,* v. 14, Aug. 1958, p. 389t-395t.

Corrosion rate of Types 431, 17-PH, 17-7 PH, PH 15-7 Mo and Type 304 stainless steels in various heat treated conditions in sulphuric acid, hydrochloric acid, nitric acid, formic acid, acetic acid, phosphoric acid or sodium hydroxide of varying concentrations and at different temperatures. Resistance of precipitation hardening stainless alloys to sea water, high-purity water, stress-cracking and galvanic corrosion. Effects of nitriding, welding or brazing on corrosion resistance. Resistance of precipitation hardening and hardenable stainless steels to corrosion by industrial and marine atmospheres. 26 ref.
(R-general; 2-61, 2-64, 2-66; SS)

565-R.* (German.) Corrosion Resistance of Anodized Coatings Suffering From Hairline Cracks. H. Neunzig. *Aluminium,* v. 34, July 1958, p. 390-391.

Influence of electrolyte temperature on susceptibility of bright anodized coating 5-15 microns thick to hot cracking and corrosion. High-purity Al-Mg alloy sheet anodized at 17 and 25° C. and then exposed to temperatures above 100° C. 15-micron coatings developed clearly visible hairline cracks which were susceptible to corrosion. High electrolyte temperature increased rate of corrosion when hairline cracks formed.
(R2g, L19, 2-61, 9-72; Al-b)

566-R.* (German.) Experiences With Light Metal Products in the Tropics. M. Rauschert. *Aluminium,* v. 34, July 1958, p. 406-409.

Experiences with Al equipment on two expeditions into Amazon regions. Trunks, special containers, cans, Al foil, cartridge cases and protective covers of Al showed good

corrosion resistance.
(R3s, T6, T10; Al-b)

567-R. (Russian.) **Some Data Concerning the Resistance to Intercrystalline Corrosion of Pure-Austenite Steels Containing 23% Chromium and 23-28% Nickel.** Yu. I. Kazennov and L. P. Kolosova. *Avtomaticheskaya Svarka,* no. 2, 1957, p. 11-21.

Effects of heating, during welding, on resistance to intercrystalline corrosion of steels containing 0.06-0.09% C. (R2h, K9n; SS, 7-51)

568-R. (Russian.) **Corrosion of Cylinders of Automotive Engines.** B. B. Genbom. *Avtomobil'naya i Traktornaya Promyshlennost,* no. 5, 1956, p. 18-23.

Cylinder corrosion is essentially of electrochemical nature. One of the principal causes of uneven wear of the cylinders is the uneven temperature distribution over their inner surface. The rate of wear of any given area increases with lowering of its temperature during operation. (R1a, Q9n, T21b)

569-R. (Russian.) **Protective Potentials of Metals.** V. V. Gerasimov. *Izvestiya Akademii Nauk SSR, Otdelenie Khimicheskikh Nauk,* no. 3, 1957, p. 263-269.

Method of calculating protective potentials is based on the assumption of the existence of an exponential correlation between rate of corrosion of the metal and its potential (on the condition that ionization of the metal constitutes the controlling stage of the process). (R1a)

570-R. (Russian.) **Corrosion Resistance of Aluminum and Copper.** V. I. Avdeyeva, L. P. Povalyayeva and A. Ya. Shatalov. *Trudy Voronezhskogo Universiteta,* no. 2, 1956, p. 79-80.

Rate of corrosion of pure Cu and Al in buffer solutions in the presence of different additions of 0-1.0 *N* Cl ions, encompassing the pH range of 2-12. Cu showed minimum corrosion rate at pH 10-11.0, depending upon Cl ions; minimum rate for Al was at pH 7.0-7.5 irrespective of the Cl ion content of the solution. (R6; Al, Cu)

571-R. (Russian.) **Investigation of Corrosion Resistance of Solid Solutions of Metals. Pt. 1. The System In-Pb.** N. N. Gratsianskiy and M. L. Kaplan. *Zhurnal Fizika Khimii,* no. 3, 1956, p. 651-659.

Rate of corrosion, steady-state potential and microhardness of solid solutions of the In-Pb system in the range 0-100 at. %. Corrosive media used: 1% H_2SO_4 1% citric acid at 16 and 50° C.
(R6g; In, Pb, 14-67)

572-R. An Investigation of Intergranular Oxidation in Stainless Steels and High-Nickel Alloys. C. A. Siebert, M. N. Sinnott, L. H. DeSmyter and R. E. Keith. University of Michigan. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131471, June 1955, 108 p. $2.75.

Grain-boundary oxidation of chromel alloys ASM, ARM and D, and Type 310 stainless steels in the range of 1600 to 2000° F. These alloys and Inconel were oxidized for 100-hr. periods in the stressed condition and up to 500 hr. in the unstressed condition; intergranular measurements were obtained microscopically. Stress caused an increase in intergranular penetration when a minimum stress was reached. In general, the intergranular penetration increased with increasing time and temperature. A plot of the square of the specific weight gain vs. temperature resulted in a straight-line relationship. (R1h, R2h; SS, Ni)

573-R. (Russian.) **Corrosion Characteristics of Welded Seams of Stainless Steels in Oxidizing Solutions.** B. I. Medobar, N. A. Langer and M. M. Kurtepov. *Avtomaticheskaya Svarka,* no. 2, 1957, p. 57-60.

Tests in boiling 15% HNO_3 (I), 55% HNO_3 (II) and 15% solution of HNO_3 + 10% $K_2Cr_2O_7$ (III), have shown that in I all the seams tested are stable, in II the rate of corrosion is 100-200 times higher. In III a sharp acceleration in corrosion takes place. (R6g; SS, 7-51)

574-R. (Russian.) **Passivity of Steel in Nitrose.** Ye. I. Litvinova. *Zhurnal Prikladnoi Khimii,* no. 10, 1956, p. 1521-1529.

Study of passivation of steel in hot nitrose acid containing 1-10% HNO_3 and 75-76% H_2SO_4. The steel undergoes strong corrosion with extensive evolution of gas, but as a result of passivation this process suddenly ceases. The greater the initial rate of corrosion, the shorter

is the time until passivation results. At optimal passivation temperature of 100° a protective layer is formed about 3 microns thick, consisting of $Fe_2(SO_4)_3$. (R10c, R6g; ST)

575-R. **HRP Radiation Corrosion Studies: In-Pile Loop L-4-11.** J. R. McWherter and J. E. Baker. *U. S. Atomic Energy Commission, ORNL-2152,* 1958, 48 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.50.

Corrosion studies of Zr and Ti alloys and stainless steels, as well as specimens of synthetic sapphire, sintered alumina, Pt and Incoloy. Zr alloys Zr-3 (3% Ag), Zr-3 (0.52% Sn, 5.71% Ti, 40 ppm. N_2), Zr-3 (0.52% Sn, 0.28% Fe, 5.66% Ti, 60 ppm. N_2), Zr-3 (1.4% Fe) and Zr-4 (0.7% Fe, 2.8% Cr) corroded at rates about two or three times those observed for Zircaloy-2 at the same power density. Corrosion rates for Incoloy were found to be about the same as those for stainless steel exposed to similar conditions. (R-general, T11; Zr-b)

576-R. (Czech.) **Corrosion of Silver Articles.** Karel Komarek. *Casopis Narodniho Musea, Oddeleni Prirodoved,* v. 124, no. 2, 1955, p. 136-141.

Physico-chemical properties of Ag and causes of its corrosion in air and in the soil. (R-general; Ag)

577-R. (Russian.) **Corrosion of Steel in the System Nitric Acid-Acetic Acid.** A. V. Titov. *Trudy Ivanovskogo Khimiko-Tekhnologi-Cheskogo Instituta,* no. 5, 1956, p. 80-81.

Maximum rate of corrosion is observed in the pure acids, and a minimum rate in a mixture of acids containing 42% by volume of HNO_3. (R6g; ST)

578-R. (Russian.) **Supplementary Uses of a Type of Special Cast Iron.** *Tyshko. Prace Instytut Odlewn,* v. 6, no. 1-2, 1956, p. 10-21.

Cast iron with 5-8% Si is noted for its heat resistance. At around 900° it withstands oxidation well, but has significantly lower resistance to alkalies and salts. Addition of small amounts of Mo (2-4%) improves resistance to HCl and related chemical products. Aluminum cast iron is comparatively cheap and naturally suitable for production of lightly loaded articles working at high temperatures. High Cr cast iron also possesses good wear resisting qualities and is used for mill-roll facers, for the production of brakeblocks and parts of pumps. (R1h, R6, Q9n, 17-57; CI-q)

579-R. (German.) **Investigation of Thermoelectric Wear of Hard Metal Turning Tools and Its Elimination by Electrical Compensation.** Theodor Hehenkamp. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 249-256.

Thermoelectric currents resulting from contact at different temperatures between tool and production part cause wear by transfer of matter. 17 ref. (R2a, Q9, G17a, T6n; Ti, Ta, W, 6-69)

580-R.* (English.) **Strain Electrometry, Corrosion and Catalysis.** A. G. Funk, D. N. Chakravarty, H. Eyring and C. J. Christensen. *Zeitschrift fur Physikalische Chemie,* v. 15, no. 1-6, Apr. 1958, p. 64-74.

Effects of pH, ferrous ion concentration, oxygen and inert gases such as hydrogen and argon, as well as polarization effects, on the initial voltages and on the transients induced by straining on iron wire immersed in solution. Results are explained in terms of known catalytic and corrosive processes occurring at the electrode. Strain electrometry provides a valuable and relatively new approach to the problems of corrosion and catalysis. 15 ref. (R11a, R10c, P13c; Fe)

581-R.* (German.) **Effect of Trace Elements in Oxidizable Molten Metal and the Kinetics of Increased Concentration at Melt Surfaces.** Friedrich Erdmann-Jesnitzer and Hansfriedrich Hadamovsky. *Freiberger Forschungshefte,* no. B28, 1958, p. 32-35.

Oxidation stability of principal metal is enhanced whenever concentration of trace elements is increased at surfaces of the melt. Enrichment of all trace elements (excluding inert ones) at the surface is a general phenomenon, characterized by diffusion to outer melt surfaces and through the oxide lattice. It is due to primary oxidation of trace elements, their preferred diffusibility through the oxide lattice and dependent upon small atoms or ion size of trace element as well as low solubility in principal metal. Favorable oxidation stability of molten metal can thus be predicted. 5 ref. (R1h, N14; Pb, Zn, Cd, Al, Bi)

582-R. (Hungarian.) **Effect of Titanium and Boron on the Corrosion Resistance of High-Purity Aluminum.** H. M. Gyenlesne. *Magyar Tudomanyos Akademia Muszaki Tudomanyok Osstalyanak Kozlemenye,* v. 12, no. 1-4, 1954, p. 365-376.

Grain-refining additions of Ti and B do not reduce the corrosion resistance of Al. Up to 0.6% Ti does not lower corrosion resistance; boron somewhat accelerates the dissolution of Al in sulphuric and hydrochloric acids, but the effects of B in technical Al is very small, since the main element which lowers corrosion resistance is Fe. No correlations can be deduced about the effect of these additions on resistance to corrosion by the atmosphere or by weakly corrosive media, but the effects are small.
(R3, R6, 2-60; Al-a, *Ti, B*)

583-R.* (Italian.) **Use of Aluminum in Contact With Other Metals.** A. Prati. *Ingegneria Meccanica,* v. 6, July 1957, p. 9-16.

Galvanic corrosion; galvanic behavior of Al. Review of recent studies of corrosion of Al in bimetallic couples; conclusions and recommended conditions for use of Al in contact with other metals. 6 ref. (R1a; Al, 17-57)

584-R. Study of the Process of the High-Temperature Oxidation of Metallic Titanium in Water Vapor. G. P. Luchkin and G. G. Il'in. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 521-523. (Henry Brutcher, Altadena, Calif., Translation no. 3830.)

Oxidizability of Ti is higher in water vapor than in air. X-ray diffraction study shows that only the TiO_2 phase enters into the composition of the scale. Other phases (Ti_2O_3 and TiO) have not been detected by X-ray diffraction. The size of the grain of the scale diminishes monotonically from the outside portion to the surface of the metal. The greater oxidizability of Ti in water vapor is connected with the facilitated diffusion of O_2 through the layer of scale, which in turn is caused by its structural features. (R1h, 2-62; Ti)

585-R. (Russian.) **Problem of Oxidation of Molybdenum in the Temperature Range Above the Melting Point of MoO_3.** V. I. Arkharov and Yu. Kozmanov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 566.

Speed of oxidation of Mo in air was measured at 900 to 1300° C., i.e., above the melting temperature of MoO_3 (793° C.). Speed was measured from the gain in weight of the specimen per unit surface area after 20 min. oxidation. Speed remains almost constant over a wide temperature range. Speed of oxidation depends substantially on the partial pressure of O_2. At 900° C. only MoO_3 can be detected by X-ray diffraction, and at 1100 to 1300° C. the specimens become covered with a thin film of MoO_2. Possible mechanism of the oxidation of Mo above the melting point of MoO_3. (R1h, 2-62; Mo)

586-R. Effect of Metals on Lubricants. Pt. 2. Corrosion and Oxidation Stability at 400° F. J. B. Christian. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131710, Feb. 1958, 35 p. $1.

Effects which metals and alloys used in various aircraft systems, and the fluids and lubricants employed in these systems, have on one another. The fluids were blended with various additives which improve their viscosity-temperature properties and retard oxidation. Corrosion and oxidation stability of a diester blend, a siloxane, and a silicate in the presence of various metal specimens. Lead was the only metal attacked by all fluids tested. It was also the only metal which caused significantly noticeable changes in the fluids.
(R7e; Pb)

587-R. Development of an Improved Corrosion Inhibitor for Water-Alcohol Solutions. D. B. Conklin, B. G. Peacock and J. E. Cole. Wyandotte Chemicals Corp. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131781, July 1956, 82 p. $2.25.

For use with alcohol-water injection fluid for aircraft engines. It inhibits corrosion of steel, stainless steel and Al alloys, is soluble in methanol, ethanol, water or mixtures of the liquids, and lowers surface tension of the mixtures. Although the inhibitor is chemically compatible with hard water solutions, inhibition efficiency is in-

versely proportional to water hardness. The inhibitor is a mixture of dicyclohexyl-ammonium nitrate, urea and 1-nitropropane in an anhydrous methanol solution.
(R10b, R7f; ST, SS, Al)

588-R. (Russian.) **Composition of Rust Developing on Iron in Contact With Water and Air.** I. V. Krotov. *Zhurnal Fizicheskoi Khimii*, v. 30, no. 8, 1956, p. 1696-1701.

The composition of old rust produced by Fe powder previously wetted with distilled water ground in a whirling grinder and rusting in air was studied by chemico-analytical and thermographic methods. Rust consists of gamma FeOOH, which loses the absorbed water when heated to 149° C. Gamma FeOOH transforms into gamma Fe_2O_3 at a further temperature rise. The process discontinues at about 290° C. The process of transition from gamma Fe_2O_3 into alpha Fe_2O_3 ends at about 676° C.
(R3, R4; Fe)

589-R.* **Corrosion Rate of Wrought Iron.** *Product Engineering (Design Digest)*, v. 29, Sept. 1958, p. B5.

Improved wrought iron shows 20-25% better resistance to corrosion from industrial atmosphere, acid and salt water.
(R3, R4b, R6; Fe-m)

590-R.* **High Alloys to Combat Corrosion.** Edward D. Weisert. *Product Engineering (Design Digest)*, v. 29, Sept. 1958, p. B16-B17.

Composition, corrosion resistance of Ni-Mo, Ni-Mo-Cr, Ni-Cr-Fe-Mo, Co-Cr-W-Ni, Co-Cr-W-C, Fe-Si, Fe-Si-Mo, Ni-Si alloys.
(R-general; Ni-b, Co-b, SGA-g)

591-R.* **Corrosion Properties of Titanium, Zirconium, Tantalum and Type 316 Stainless Steel.** *Welding Engineer*, v. 43, Sept. 1958, p. 41-43.

Resistance in a wide range of acids, bases, and salts at room and elevated temperatures.
(R6, R7, 2-62; Ti, Zr, Ta, SS)

592-R.* (German.) **Comparison Between Results of Exposure Tests in Industrial Air and Accelerated Corrosion Tests in Sulfur Dioxide Atmospheres.** A. Kutzelnigg. *Werkstoffe und Korrosion*, v. 9, July 1958, p. 429-434.

Roll of sulphur dioxide in corrosion reactions; Trestor apparatus for accelerated sulphur dioxide corrosion tests; uniformity of results achieved in apparatus. Dependence of water vapor condensation on time. Results of exposure tests in industrial atmosphere and accelerated tests show good agreement for Ni deposits, Zn-rich paints and varnish systems. 20 ref.
(R3, R11q; Ni, NM-g)

593-R.* (German.) **Comparing Exposure Tests on the Corrosion Resistance of Passivated Galvanized Steel.** T. Biestek. *Werkstoffe und Korrosion*, v. 9, July 1958, p. 434-439.

Results of three-year exposure tests on galvanic Zn coatings passivated by 15 different chemical methods. Test atmospheres were industrial, urban, rural and marine. Considerable variation in corrosion resistance was observed with use of different acid and chromate solutions for passivating. Comparison of exposure and accelerated tests. 10 ref. (R3, R10c; ST, *Zn*, 8-65)

594-R.* (German.) **Corrosion of Steel Pipes in Refinery Equipment by Sulphur-Rich Crude Oil.** P. Csokan. *Werkstoffe und Korrosion*, v. 9, July 1958, p. 443-450.

Corrosion and its thermal decomposition products. Chemical analysis and X-ray investigation of corrosion products. Corrosion mechanisms. 22 ref.
(R7a; ST, 4-60)

595-R.* **Mechanism of Oxide Film Formation on Zirconium.** O. Flint and J. H. O. Varley. *Physics and Chemistry of Solids, Journal*, v. 6, Aug. 1958, p. 213-222.

Surface condition of Zr controls both thermal and anodic oxidation. Effect of ultraviolet light. The interpretation suggested for these observations is in terms of the possible variation in electronic work function and defect state of the oxide depending upon the physical condition of the metal surface. These variations will affect the efficiency of anodic film formation, and a qualitative scheme of possible mechanisms whereby film growth is controlled is described. 11 ref.
(R2r; Zr)

596-R. **Thin Metal Films as Corrosion Indicators.** R. B. Belser and F. E. Hankinson. Georgia Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services*, PB 131894, May 1958, 98 p. $2.25.

Need for a sensitive, easily inspected, economical corrosion indicator which would integrate, with respect to time, the total exposure of packaged material to corrosive conditions. Corrosion properties and rates of Fe and Mn films and of the bimetal pairs Fe-Cu and Fe-Au. Important role in metal film corrosion of the adsorbed gas layer normally present on glass substrates. This layer furnished oxygen necessary for small particles of the oxides of iron to form at random sites on the film. These subsequently became elements of electrolytic cells, and destructive oxidation of the film proceeded by electrochemical processes.
(R11a, R2r, R10e; Fe, Mn, Cu, Au)

597-R.* (English.) **Effect of Temperature on the Electrode Potential Behavior of Titanium and Its Bearing on the Mode of Oxidation of the Metal.** E. M. Khairy and M. M. El Khatib. *Egyptian Journal of Chemistry,* v. 1, no. 1, 1958, p. 57-63.

Potential-temperature curves obtained from spectrographically pure Ti electrodes in air show a maximum and a minimum for the potential within the range 25-60° C. Curves from Sb plated electrodes reach the maximum and minimum values between 30 and 50° C. By exposing the electrodes alternately to hydrogen and high vacuum, their potential is activated and varies linearly from 25 to 50° C., having the temperature coefficient −6.4 mv. per °C. (R1h, P15; Ti)

598-R.* (Czech.) **Resistance of Ferrito-Pearlitic Steels to Corrosion in Water Vapor and in Combustion Products at Temperatures Above 530° C.** Bohumil Prenosil. *Hutnické Listy,* v. 13, no. 7, 1958, p. 603-612.

Growth of protective oxide layer. Effects of water vapor pressure, prestress, sodium phosphate contamination, contamination with sodium hydroxide on corrosion penetration. Presence of sulphur dioxide and oxygen in combustion products and their influence on corrosion. Comparison between corrosion resistance in water vapor and in combustion products. 13 ref.
(R4d, R7d, 2-62; AY)

599-R. Rust Preventives. E. J. Colerick. *Lubrication Engineering,* v. 14, Aug. 1958, p. 350-354.

Metallic coatings; nonmetallic coatings; petroleum base rust preventives; volatile corrosion inhibitors. (R10, L-general)

600-R. Studies on the Oxidation Characteristics of High-Carbon Steel at Different Electrostatic Potentials. K. C. Som, R. Ganguly and G. P. Chatterjee. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 183-193.

Specimens were charged to ± 12 volts. Rate of oxidation of a neutral specimen of high-carbon steel is greater than that of a positively or negatively charged specimen. The negatively charged specimen is less reactive in the initial stages of oxidation than the positively charged specimen. But the positively charged specimen becomes less reactive at later stages. 6 ref.
(R1h; CN-r)

601-R. Selecting Materials to Avoid Cavitation Damage. William J. Rheingans. *Materials in Design Engineering,* v. 48, Sept. 1958, p. 102-106.

Various types of stainless steel and aluminum bronze provide the best resistance to cavitation erosion in hydraulic equipment. There is a wide variation in the resistance of similar materials, and a small change in a material's chemical content or properties can substantially affect its resistance to cavitation damage. (R2m; SS, Cu-s, *Al*)

602-R. (German.) **Electrolytic Passivation of Silver With the "Argalin" Process.** H. W. Dettner. *Metalloberfläche,* v. 12, July 1958, p. 197-199.

New method of producing a transparent, durable passivated layer on Ag surfaces. (R10c; Ag)

603-R. (German.) **Electrochemical Behavior of Bimetallic Electrodes and the Application of Their Overpotential Curves in Corrosion Research.** G. Bianchi and G Caprioglio. *Werkstoffe und Korrosion,* v. 9, July 1958, p. 440-443.

The dependency of polarization voltage of a two-phase electrode upon situation and size of local cell surfaces, anodic and cathodic processes on local electrodes, direction and density of external current and the position of reference electrode are utilized for investigation of current density-voltage curves of electrodes which are corroded by local currents. 6 ref. (R1a, R11)

604-R.* Effect of Impurities Upon the Resistance of Magnesium Casting Alloys AZ92 and AZ63 to Corrosion. B. J. Nelson. *Modern Castings,* v. 34, Oct. 1958, p. 78-86.

Accelerated tests in NaCl-H_2O_2 by alternate immersion and in 3½% NaCl spray; various atmospheric exposures. (R3, R6, R11g, R11j; Al)

605-R. The Corrosion of Zircaloy-Base Fuel Alloys in High-Temperature Water. Stanley Kass. Westinghouse Electric Corp., Bettis Plant, Pittsburgh. *U. S. Atomic Energy Commission WAPD-TM-123,* Jan. 1958, 23 p.

Corrosion of Zircaloy-2 and Zircaloy-3 base alloys with uranium and without the addition of boron is characterized by the initial formation of a protective oxide film followed by a breakdown of the film and general spalling. Corrosion resistance is affected by prior thermal history. Addition of minute amounts of B greatly influences the corrosion rates and heat treatment responses.
(R4, 2-62, 2-60; Zr-b, U)

606-R. An Investigation of Uranium Corrosion in 100° C. Water and 200° C. Steam at Atmospheric Pressure. Oliver M. Stewart, Warren E. Berry, Paul D. Miller, Dale A. Vaughan, John B. Schroeder, Frederick W. Fink and Charles M. Schwartz. Battelle Memorial Institute. *U. S. Atomic Energy Commission BMI-1271,* June 19, 1958, 15 p.

Material balance studied by examination of the phase composition and valence state of the corrosion product and by hydrogen-evolution measurements. The corrosion rates in atmospheric-pressure steam above 100° C. are lower than those obtained in tests carried out in water with a hydrogen overpressure. 9 ref. (R4, 2-62; U)

607-R. Stress Corrosion Cracking of Austenitic Stainless Steels. H. H. Uhlig, John Lincoln, Jr. and Richard A. White. Massachusetts Institute of Technology. *U. S. Office of Technical Services,* PB 128219, Apr. 1957, 56 p. (Available at Library of Congress, Washington, D. C.; Microfilm $3.60, Photostats $9.20.)

Transgranular stress-corrosion cracking of 18-8 Type 304 specimens in 42% $MgCl_2$ does not depend on rate of stressing, whether specimens are bent in 10 min. or a fraction of a second. Addition of hydrochloric acid to $MgCl_2$ decreases cracking time, whereas addition to sodium hydroxide increases cracking time. (R1d; SS-e)

608-R. Investigation of Intergranular Oxidation in Stainless Steels and High-Nickel Alloys. Clarence A. Siebert, Maurice J. Sinnott, Lynn H. DeSmyter and Robert E. Keith. Michigan University. *U. S. Office of Technical Services,* PB 131471, June 1955, 110 p. $2.75.

Chromel alloys ASM, ARM and D and Type 310 stainless steels were oxidized for 100-hr. periods in the stressed condition. Intergranular oxidation measurements were obtained microscopically. Influence of stress, increasing time and temperature, water-vapor content of the air and preferred orientation. Visual and magnetic examinations on the oxidized specimens and their oxides. (R2h, R1h; SS, Ni-b)

609-R.* (German.) Effect of Different Impurities on Corrosion Resistance of Super-Pure Aluminum in Water at High Temperature and High Pressure. A. Domony. *Acta Technica,* v. 21, no. 1-2, 1958, p. 123-139.

Corrosion resistance of high-purity Al alloyed with different amounts of Si, Fe, Ti and B. Only Al containing certain kinds and amounts of foreign phase constituents was resistant. Corrosion behavior strongly enforced not only by formation of oxide films and electrochemical behavior of phases against base metal but also by depolarizing effect of alloy phases. 10 ref. (R4, 2-60, 3-69; Al)

610-R.* (German.) X-Ray Investigations of Scale Layers on Sintered Iron-Aluminum Compacts. Franz M. Oberhauser. *Zeitschrift für Metallkunde,* v. 49, June 1958, p. 343-345.

At an annealing temperature of 1350° C. granular scale films are formed of alpha Fe_2O_3. The lattice size of alpha Fe_2O_3 scale seems to be a little bigger than that of pure alpha Fe_2O_3. At 1200° C. the scale is composed of a Fe_3O_4 intermediate layer and an outer layer of alpha Fe_2O_3 and Fe_3O_4.
(R2q, M26; Fe, Al, 6-72)

611-R.* Current and Potential Relations for the Cathodic Protection of Steel in Salt Water. W. J. Schwerdtfeger. *Corrosion,* v. 14, Oct. 1958, p. 446t-450t.

Cathodic protection of steel specimens exposed for 60 days to both stagnant and aerated city water, to which was added 3% by weight of sodium chloride. 8 ref.
(R10d, R4b; ST)

612-R.* Processes of Electrochemical Corrosion. G. V. Akimov. *Corrosion,* v. 14, Oct. 1958, p. 463t-483t.

Theoretical considerations involved in determining the potential of hydrogen and oxygen electrodes. The theory of microcells is examined and some of the experimental data for processes with hydrogen depolarization reviewed. Influence of alloying elements on corrosion rates of metals in various media. Electrochemical cells with differential aeration, corrosion processes in a moisture film and atmospheric corrosion. 20 ref. (R1a)

613-R.* Corrosion Resistance of Ductile Iron. F. L. Laque. *Corrosion,* v. 14, Oct. 1958, p. 485t-492t.

Internal structure of ordinary gray iron, pearlitic ductile iron, ferritic ductile iron, malleable iron and mild steel compared. Differences in the amount of carbon present and in the form in which it occurs are responsible for some differences in the corrosion behavior of these materials. Data in acids, in neutral and alkaline solutions, in sea water, in the atmosphere and underground given. 14 ref.
(R-general, 3-71, CI-r)

614-R.* Long-Range Field Burial Study Probes Underground Corrosion. *Iron Age,* v. 182, Oct. 9, 1958, p. 77-80.

Corrosion of plain ferrous metals, low and high-alloy steel and iron, nonferrous metals in various soil types. (R8)

615-R. Pinhole Corrosion Testing of Aluminum-Clad, Nickel-Bonded Fuel Elements. C. L. Angerman and E. C. Hoxie. E. I. du Pont de Nemours & Co. *U. S. Atomic Energy Commission DP-269,* Feb. 1958, 24 p. $1.25. (Available from U. S. Office of Technical Services.)

A corrosion test was developed to indicate the quality of the bond between the Al cladding and Ni-plated U core of fuel elements. The rate of corrosive attack was found to be dependent on the distribution of the oxide phase in the bond. 11 ref. (R11; Al, Ni, U, 8-66)

616-R.* Influence of Radiation Upon Corrosion and Surface Reactions of Metals and Alloys. M. T. Simnad. Paper from "Effects of Radiation on Materials", Reinhold Publishing Corp., 1958, p. 126-143.

Changes in metal properties and changes in composition of ambient environment which result from nuclear irradiation and which influence surface reactions or corrosion. Corrosion of fissionable and nonfissionable metals in nuclear reactor by water or aqueous solutions. Influence of irradiation on gas-solid reactions; effect of proton radiation upon surface reactions. 34 ref.
(R-general, T11, N15, 2-67)

617-R.* (French.) Stress-Corrosion in Homogeneous Alloys. Ludwig Graf. *Corrosion et Anticorrosion,* v. 6, May 1958, p. 151-161.

Influence of mechanical strain on corrosion of mixed homogeneous crystals (Ag-Au; Cu-Au; Cu-Zn) in contact with chemical agents or with mercury. In the case of mercury the attack depended on the concentration of mixed crystals but was not influenced by inversion of proportion of crystal components. It reached a maximum at 50% Au. The increased activity of grain limits, or "effect of mixed crystals" is considered to be the initial cause of crack formation. 11 ref.
(R1d; Ag, Au, Cu, Zn)

618-R.* (French.) Standard Tests for Iron Corrosion and Cathodic Protection. *Corrosion et Anticorrosion,* v. 6, May 1958, p. 171-176.

Soil is tested as to structure and physical and chemical properties. Corrosion tests of Fe plates in different soil types established relation between corrosion intensity and ratio of water to air. Saturation limit of ground water determines the limits of active or passive iron behavior. The more this saturation limit is exceeded the weaker the effective cathodic protection on the Fe. Temperature and energy coefficients can be calculated. Cathodic protection has to be calculated according to soil resistance and aggressivity. 9 ref. (R8, R10d; Fe)

619-R.* (German.) Precipitation Processes and Intergranular Corrosion in Stainless Austenitic Chromium-Nickel Steel Containing Columbium. Karl Bungardt and Gustav Lennartz.

Archiv für das Eisenhüttenwesen, v. 29, June 1958, p. 359-364.

Analytical and X-ray observations on a steel with 0.056% C, 17.93% Cr, 10.92% Ni and 0.54% Cb to determine the influence of quenching temperatures between 900 and 1200° C., annealing temperature between 500 and 800° C. and annealing time between 2 and 10,000 hr. Relation between separation processes and resistance against intercrystalline corrosion during tests in a copper sulphate-sulphuric acid solution. Formation of Cr carbides and Cb carbides followed through the various phases. (R2h, 2-64; SS, *Cb*)

620-R.* (German.) **Electrochemical Properties of a Passive Austenitic Chromium-Nickel Steel, of a Chromium-Molybdenum Steel and Passive Electrolytic Chromium in Boiling 20% Sulphuric Acid.** Carl Carius. *Archiv für das Eisenhüttenwesen*, v. 29, July 1958, p. 449-461.

The processes on passive electrodes under the influence of "Redox" potentials analyzed. Current density-voltage diagrams for a steel with 18% Cr and 8% Ni, one with 27% Cr and 2% Mo and for electrolytical Cr in boiling sulphuric acid of 20% concentration after polarization times from 2 to 50 hr. Corrosion velocities are measured gravimetrically and compared. Corrosion current attacks the components Fe and Ni selectivity in the solid solution. 11 ref. (R6g; SS, Cr)

621-R. (Japanese.) **Indispensable Metals for Petroleum Industry.** S. Hijikata. *Metals*, v. 28, Sept. 1958, p. 641-646.

In the distillation process corrosion is mainly caused by sulphides, chlorides and organic acids. Most useful alloy is Cr steel (STB-35, STC-42E). If there is "below dew point corrosion", Cu alloy is better than STC-30, STC-42E, STC-42F. In the thermal cracking process up to 300° C., 4-6% Cr-steel is used. If H_2S is formed, lining of 11-13% Cr steel is preferable. In the re-forming process petroleum is heated at 500° C., so that stainless steel and Cr-Ni alloy are used. If lining is necessary, 405, 304 or 316 stainless steel is used. In general 316 or 317 steel is most reliable.
(R7a, T29n, 17-57; SS)

622-R.* (Polish.) **Mechanism of Formation of a Double-Layer Oxide Scale on Copper-Zinc Alloys.** Lucjan Czerski, Stainislaw Mrowec and Teodor Werber. *Archiwum Hutnictwa*, v. 3, no. 2, 1958, p. 113-123.

Oxidation was carried out in air at 900° C. on alloys containing 9 to 15% Zn. Compacted external layer composed of cuprous oxide formed as result of outward diffusion of Cu. Internal scale composed of bi-phase mixture of cuprous oxide and ZnO formed by inward diffusion of oxygen. Increasing concentration of Zn in the alloy raised ZnO content in the internal scale and resulted in increased rate of inward diffusion of oxygen. Contents of ZnO in internal scale decreased with increasing distance from metallic core. 15 ref.
(R1h, N1; Cu-b, *Zn*)

623-R.* (Russian.) **Role of Grain Size in Cavitation Erosion of Steel.** I. N. Bogachev and R. I. Mints. *Metallovedenie i Obrabotka Metallov*, Aug. 1958, p. 26-29. (Henry Brutcher, Altadena, Calif., Translation no. 4317.)

Metallographic analysis of ferritic and austenitic steels. Resistance to cavitation and erosion depends on grain size and character of grain boundaries. Intensity of cavitation is determined by joint effect of grain properties and boundaries. Results show importance of establishing relationship between cavitation-erosion resistance of steel and the properties of fine-grained steel structure. 5 ref. (R2m, 2-59; SS)

624-R.* **Erosion in Turbojet Fuel Nozzles.** H. R. Hazard, P. Gluck and R. W. Tate. *Mechanical Engineering*, v. 80, Oct. 1958, p. 58-60.

Laboratory procedure for simulating engine conditions. Radiochemical technique perfected for measuring erosion of a few millionths of a gram of material in a few hours. (R1c, 1-54, T24b)

625-R.* **Corrosion of Metals by Uranyl Salt Solution Using S^{35}.** Gunji Shinoda and Tadao Sano. *Osaka University, Technology Reports*, v. 7, Oct. 1957, p. 365-378.

Stainless steel containing Cb had high corrosion resistance and those containing Mo, Cu and other components corroded considerably; concludes that it is dangerous to decide corrosion tendency from weight loss. Reaction between the oxidized metallic ion (anion) and the uranyl ion (cation) which has strong oxidizing power; some kinds of U com-

pound will be formed.
(R6j, 1-59; SS)

626-R.* Increasing the Acid Resistance of Stainless Steels. *Platinum Metals Review,* v. 2, Oct. 1958, p. 117-119.

Cr steels with small (0.5%-1.0%) additions of Pt or Pd exhibit much lower corrosion rates in 20-50% H_2SO_4. 6 ref. (R6g; SS, *Pt, Pd*)

627-R.* The Corrosion of Thorium and Its Alloys. W. E. Berry, R. S. Peoples and H. A. Pray. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 267-276.

Reaction with gases; reaction with water; effect of alloy additions on corrosion of Th in high-purity water; solubility of Th in liquid metals. Th metal as a nuclear fuel appears to offer few corrosion problems in most liquid metal-cooled power reactors. On the other hand, apparently neither it nor its alloys are adequately resistant to water at temperatures of interest in pressurized water reactors. 12 ref. (R-general, R4, T11g; Th)

628-R. Magnesium Anodes. *Modern Metals,* v. 14, Sept. 1958, p. 36-37.
(R10d, 17-57; Mg)

629-R. Underground Corrosion. *National Bureau of Standards, Technical News Bulletin,* v. 42, Sept. 1958, p. 181-186.
(R8)

630-R. (Pamphlet.) **Development of Wrought Aluminum-Magnesium Alloys.** E. H. Dix, Jr., W. A. Anderson and M. Byron Shumaker. *Alcoa Research Laboratories, Technical Paper no. 14.* Aluminum Co. of America, Pittsburgh, 1958, 63 p.

Results of extented stress-corrosion tests on Al-Mg alloys. Influence of alloy composition, strain hardening, hot forming, stress-relief, aging at atmospheric and elevated temperatures on resistance to stress-corrosion. Emphasis on properties of alloy 5456 and 5454. 93 ref.
(R1d; Al-b, *Mg*)

631-R.* Reduction of Failures Caused by Corrosion in Pumping Wells. T. A. Bertness. *American Petroleum Institute, Proceedings,* v. 37, Sec. 4, 1957, p. 129-135.

Chemical inhibitors are of value in protecting subsurface equipment only to the extent that they can be placed where they are needed in the quantity and frequency required to do their job. Problems associated with the placement of inhibitors for protection of equipment from an environment of scale and corrosion in pumping wells. Effect of loads on the life of rods; histories of test equipment and well-treating methods. 7 ref.
(R7a, R10b)

632-R.* How Environment Directs Corrosion Control. Robert V. Jelinek. *Chemical Engineering,* v. 65, Sept. 22, 1958, p. 163-168.

Causes and nature of corrosion, influence of pH, oxidizing agents, liquid velocities and temperature. Control by inhibitors and cathodic protection. 20 ref.
(R-general, R10)

633-R.* Corrosion Resistance of Austenitic Nickel-Chromium Steel. W. Katz. *Draht (English Edition),* no. 36, Aug. 1958, p. 27-31.

Passivity and corrosion, effects of the alloy components, forms of corrosion and properties of austenitic steels in contact with various substances. 20 ref. (R-general; SS)

634-R.* Role of Hydrogen in the High-Temperature Corrosion of Zirconium and Its Alloys. Pt. 1. The Effect of Cathodic Polarization on Corrosion in Water at 325. J. N. Wanklyn and B. E. Hopkinson. *Journal of Applied Chemistry,* v. 8, Aug. 1958, p. 496-504.

Binary Zr alloys and Zircaloy 2 have been corroded in water at 325° C. with and without cathodic polarization. In some cases polarization can increase hydrogen uptake or reduce the protective character of the oxide films as assessed by capacity measurements. Alloying elements significantly influence both effects, but comparison of the alloys shows no systematic relation between their hydrogen uptakes and the loss of protective character of their films. Films formed in a previous period of unpolarized corrosion are damaged when polarized at 325° C. and at room temperature. 12 ref. (R4, 2-62; Zr-b)

635-R.* Pores and Pitting of Plated Deposits. J. M. Odkerhen. *Metal Finishing,* v. 56, Oct. 1958, p. 64-66.

Pores and pitting can be attributed to base material—porous base or poor mechanical pretreatment or occlusions in the material; chemical pretreatment; plating solution—suspended material or dissolved impurities. (R2j, L17c; 8-12)

636-R.* (Spanish.) **Nitroamines in the Protection of Iron Against Corrosion.** Mario Petit and Fernando Estalella. *Revista de Ciencia Aplicada,* v. 12, July-Aug. 1958, p. 293-298.

Ferrous metals wrapped in paper impregnated with nitrite of dicyclohexylamine or tri-ethanolamine in amounts in excess of 0.05 g. per sq. dm. effectively protected against oxidation produced by atmosphere saturated with water vapor at a temperature of 22±2° C. Procedures for preparing these corrosion inhibitors and their properties. 20 ref. (R10b, R10e; Fe, ST)

637-R.* **Oxidation of Metals; Determination of Activation Energies.** Per Kofstad. *Acta Chemica Scandinavica,* v. 12, no. 4, 1958, p. 701-707.

New method for determination of energies of activation of oxidation of metals and alloys. Metals are oxidized under conditions of linearly increasing temperature and the activation energy may be determined from one single oxidation run. In addition the method also gives the approximate temperature regions in which different rate laws of oxidation are found. Method has been applied to high-temperature oxidation of Ni, Zr, Cu and Ti. 18 ref. (R1h, P13a; Ni, Zr, Cu, Ti)

638-R.* **The Behavior of Zinc Coatings in Marine Conditions.** *Corrosion Prevention and Control,* v. 5, Sept. 1958, p. 45-48, 74.

Coatings of Al, Cd, Pb, Sn, Zn, 88-12 Cd-Sn, and 88-12 Pb-Sn alloy were applied to mild steel specimens containing 0.2% C. After two years totally submerged in sea water all the Zn coatings were found to be intact; Al coatings applied by molten metal or wire pistols were almost intact; Cd behaved fairly well, but all the other coatings were unsatisfactory. (R4b; Zn, Al, Cd, 8)

639-R.* **Castings Withstand Corrosion.** *Iron Age,* v. 182, Oct. 16, 1958, p. 194-195.

Cast stainless alloys intended for operation at temperatures below 900° F. They are used in chemical plants, oil refineries, textile and paper mills, sanitation, building construction and transportation. Chemistry of these alloys, suitable applications.
(R-general, 17-57, T29; SS)

640-R.* (French.) **Oxidation of Nickel by Ionic Bombardment.** J. J. Trillat, L. Tertian and N. Terao. *Cahiers de Physique,* no. 92, Apr. 1958, p. 161-162.

Thin film of Ni resting on support of NaCl was bombarded in electron diffractograph by ions from surrounding atmosphere; heating of specimen was avoided by sweeping ion beam. Bombardment provoked formation of a NiO oxide film oriented according to lattice of the metal, and progressively removed the surface layers of oxide thus formed without modifying their structure. Under conditions of experiment, appearance of Ni_3N does not occur, contrary to case of bombardment of thin film of Ni without supporting material. 7 ref.
(R1h, R2r; Ni)

641-R.* (French.) **Contribution to Study of Mechanism of Corrosion of Magnesium and Its Alloys.** Guy Bronoel. *Comptes Rendus,* no. 246, May 12, 1958, p. 2750-2753.

High-purity Mg and a Mg alloy containing 3% Al, 1% Zn, and 0.02, 0.016, 0.012 and 0.0006% Fe were studied. The potential/pH curves for electrodes in hydrochloric acid solutions were obtained. Experiments were made at 20, 30, 40 and 50° C. in the presence of air or under a nitrogen atmosphere. Comparative measurements were made without agitation and after violent agitation of the solution in the region next to the electrode.
(R6; Mg)

642-R.* (French.) **Interesting Properties of the General Electrical Field.** D. Petrocokino. *Corrosion et Anticorrosion,* v. 6, July-Aug. 1958, p. 241-251.

Mechanism of dissolution, thermodynamic and electrokinetic factors; modern theories on formation of metallic interface. Measurement of electrochemical potentials does not take into account phenomenon of double layer and gives only an interface potential with relation to solution. Concept of electric field created during corrosion process is presented as clew to understanding of inhibition of corrosion by means of artificial cathodic and anodic fields. 19 ref. (R1a, R10b)

643-R.* (French.) **Vapor Phase Inhibitors.** Giorgio Mantovani. *Corrosion et Anticorrosion,* v. 6, July-Aug. 1958, p. 258-264.

Types and properties of inhibitors. Results of accelerated corrosion tests on steel, Cu brass and Al in presence of SO_2 and in ordinary atmosphere. Temperature and surface condition (smoothness or

roughness) of metal greatly influence amount of corrosion occurring on surfaces protected by vapor phase inhibitors. 34 ref. (R10b)

644-R. Corrosion and Creep Behavior of Tantalum in Flowing Sodium. Gilbert E. Raines, C. Vernon Weaver and John H. Stang. Battelle Memorial Institute. *U. S. Atomic Energy Commission,* BMI-1284, 24 p. Aug. 21, 1958. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $1.00.

Corrosion behavior of commercial Ta in high-purity flowing sodium from 700 to 1200° F. and the effect of sodium exposure on the creep strength of Ta at 1200° F. Tests were conducted in forced-convection flow loops constructed of Type 316 stainless steel. Corrosion tests yielded information about the partition of interstitials, particularly oxygen, in the sodium-tantalum system. 9 ref. (R6q, Q3; Ta)

645-R. Relation Between the Structure of a Magnesium Alloy and Its Tendency to Corrode Under Strain. M. A. Timonova. *Academy of Sciences of the USSR, Proceedings,* v. 115, (1957), p. 777-779. (Translation by Consultants Bureau, Inc.)

Al is principal component responsible for corrosion in Mg-Al-Zn-Mn system if in concentrations of over 2-3%. Corrosion of Mg alloys due to selective dissolution of supersaturated solid solution, or of Mg_4Al_3. (R1d; Mg-b, Al-b)

646-R.* (Japanese.) **Simple Method of Preventing Rusting of Iron Products.** Y. Yamamoto. *Metals,* v. 28, Sept. 1958, p. 659-662.

Complete protection is not possible but limited protection is provided by methods such as cleaning, moisture-removal by silica-gel, activated alumina etc., painting with $ZnCrO_4$ paint, asphalt paint, petrolatum-grease, rustproof petrolatum, spindle oil, rustproof grease, packing of $(C_6H_{10})_2NH_3HNO_2$, and plastic film lining.
(R10a, R10f, L26; Fe-b)

647-R.* (Rumanian.) **Contribution to the Study of Resistance to Corrosion of Nodular Graphite Castings.** Irina Cornea. *Studii si Cercetari de Metalurgie,* v. 1, Jan-June 1956, p. 37-48.

Tests on resistance to corrosion by hydrochloric acid of nodular graphite iron in comparison to gray iron. The hypothesis was that nodular graphite iron must have a better behavior than gray iron in non-oxidizing acids, because in the former the cathode surface—the graphite—is smaller than in the latter. When corrosion takes place with depolarization by hydrogen, the ratio between cathode and anode surfaces determines the rate of attack resistance to corrosion was almost double for nodular graphite iron than for gray pig iron. 5 ref.
(R6g; CI-r)

648-R.* (German.) **Painting and Long-Time Corrosion Testing of Steel.** Gerhard Becker. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1186-1191.

Nineteen steels were painted and exposed to an industrial atmosphere for 22 years. Si-killed steels with low Cu and Mo alloying components showed the best weather resistance. Paints on rimming steels were less durable than on Si-killed steels.
(R3n; ST, 8-70)

649-R.* (Japanese.) **Corrosion and Erosion of Screw Propellers.** M. Kanamori and S. Ueda. *Metals,* v. 28, Sept. 1958, p. 647-651.

Mn bronze and Ni-Al bronze are mainly used. Corrosion of screw propellers in sea water is caused by an electrolytic reaction in weak alkali solution in which O_2 is dissolved, and ionized Zn is removed from Mn bronze (or Al is removed from Ni-Al bronze). Cavitation erosion is caused by an impulse which is at most 200 kg. per sq. mm. Furthermore, screw exerts torque, friction and centrifugal force, which exert tension, bending, torsion and compressive stress, and hence mechanical strength is necessary. (R4b, T22h, 17-57; Cu-s)

650-R.* (Japanese.) **Sea Water as Industrial-Water; Cathodic Protection From Electrolytic Corrosion.** T. Otobe. *Metals,* v. 28, Sept. 1958, p. 652-658.

The screen for an inlet is almost completely protected by cathodic protection. Voltage is around 12 volts and current is 10 to about 20 amp. for a bar-screen and 20 to about 30 amp. for a rotary screen. An ordinary iron screen can be used as long as there is cathodic protection. A sea-water pump should be protected in the same way. Zn anode is located on mouthpiece of pump. A sea-water pipe is also protected, but if the radius of the pipe is less than 5 in. the method cannot be applied.
(R10d, R4b)

651-R.* (Japanese.) **Potential-pH Diagram for Corrosion.** T. Okamoto and S. Nagayama. *Metals,* v. 28, Sept. 1958, p. 665-673.

Corrosion of metal is considered to be an electrochemical reaction (i.e., oxidation and reduction by means of electron transfer). The reaction rate depends on concentration, pressure, and especially on electric potential. If equilibrium potential lies between the potential of hydrogen and of metal the reaction can occur, otherwise cannot. The change of Gibbs free energy is related with chemical potentials of the constituent elements and equilibrium potential of the reaction. From this equation, one can get a diagram of the potential versus pH. (R1a)

652-R. Corrosion Cracking of Austenitic Steels at Elevated Temperatures and Pressures. V. P. Sidorov and A. V. Ryabchenko. *Metallovedenie i Obrabotka Metallov,* v. 4, June 1958, p. 25-32. (Henry Brutcher, Altadena, Calif., Translation no. 4250.)

Corrosion resistance of austenitic steels was investigated in aqueous solutions under high pressures and temperatures. Steels exposed to the actions of distilled water with limited addition of oxygen for 500 hr. at 300° showed no corrosion cracks. Solutions of NaCl, Na_3PO_4, Na_2SO_4, Na_2HPO_4 and Na_2SO_3 produce no cracks in austenitic steels. Addition of the NaCl to basic solutions inhibit tendency toward cracking. Heat treatment does not affect corrosion resistance. 8 ref. (R4, R6, 2-62, 3-74; SS)

653-R.* (Russian.) **Gaseous Corrosion of Titanium-Base Alloys Subjected to Furnace or Induction Heating.** V. A. Yakovlev and Ya. I. Spektor. *Metallovedenie i Obrabotka Metallov,* June 1958, p. 52-56. (Henry Brutcher, Altadena, Calif., Translation no. 4255.)

Corrosion in furnaces with moist air is more intensive than in those with air dried by high temperature. Corrosion in undried atmosphere rapidly rises at 700°. In induction heating to 1200° at the rate of 10-50° per sec. the depth of change in the surface layer is 5-6 times less than in furnace heating. Scale formation in induction heating is shifted upward about 200° when the rate of heating is increased. 4 ref. (R7g; Ti)

654-R. Passivity During the Oxidation of Silicon at Elevated Temperatures. Carl Wagner. *Journal of Applied Physics,* v. 29, Sept. 1958, p. 1295-1297.

(R1h; Si)

655-R. Sulphuric Acid Corrosion of Stainless Steels. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 1, 85A-86A.

(R6g; SS)

656-R. Precipitation of FeO in Scales Formed by Oxidation of Iron at High Temperatures. J. Paidassi. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 447-451. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB66.)

Previously abstracted from original. See item 8-R, 1956. (R1h; Fe)

657-R. Corrosion by Sulphuric Acid. Y. Bunger. *Werkstoffe und Korrosion,* v. 6, June 1956, p. 322-330. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1484.)

Previously abstracted from original. See item 390-R, 1956. (R6g, AY)

658-R. Studies of Structure and Adhesion of Scale on Plain Carbon Steel Plates. H. J. Engell and F. K. Peters. *Archiv für das Eisenhüttenwesen,* v. 28, no. 9, 1957, p. 567-574. (Henry Brutcher, Altadena, Calif., Translation no. 4329.)

Previously abstracted from original. See item 161-R, 1958. (R2q, M28; CN, 4-53)

659-R.* (French.) **Formation of White Rust.** A. Herz. *Metallurgie et la Construction Mecanique,* v. 90, July 1958, p. 559-561.

Composition of white rust on Zn, conditions under which it is formed, influence of temperature and humidity; protection by passivation, grease films, flexible paints. (R1h, R10; Zn)

660-R.* (Serbian.) **Stress-Corrosion Cracking of Austenitic Stainless Steels in Magnesium Chloride Aqueous Solution.** T. P. Hoar and J. G. Hines. *Zastita Materijala,* v. 5, no. 4, 1957, p. 127-137.

Electrochemical behavior of 18-8 stainless steel wire stressed in a hot concentrated $MgCl_2$ solution depends on magnitude of applied stress, temperature, composition of steel and thermal treatment. Cathodic protection gives good results. (R1d, 2-62, R6g; SS-e)

661-R.* (French.) **Protection of Light Metal Assemblies in Aircraft Construction.** Paul Roussetbert. *Corrosion et Anticorrosion*, v. 6, Sept. 1958, p. 272-287.

Cathodic protection (cladding), chemical oxidation, anodic oxidation and organic coatings as applied to wing and fuselage assemblies, homogeneous or heterogeneous, either riveted, welded or bolted. Role of each type of protection; principles and description of processes.
(R10, L-general, T24; EG-a39)

662-R.* (French.) **Protection of Steel Against Underground Corrosion.** Kurt F. Tragardh. *Corrosion et Anticorrosion*, v. 6, Sept. 1958, p. 292-297.

Study of corrosion of buried steel framework in Swedish electrical power supply system. For mildly aggressive soils, hot dip galvanizing provides adequate protection. For highly corrosive soils, extra thickness of steel (1, 2 or 3 mm., depending on nature of soil) is recommended in addition to galvanizing.
(R8, L16; ST, *Zn*)

663-R.* (French.) **Statistical Study of a Case of Corrosion.** Cl. Meyer. *Corrosion et Anticorrosion*, v. 6, Sept. 1958, p. 298-317.

Corrosion of bottom of steel reservoir for hydrocarbons which was being retired from service. Purpose was to determine extra thickness of bottom plate to allow for replacement reservoir. Problem was handled by method of "population sampling" and statistical analysis. 7 ref. (R7g, S12; ST)

664-R. (Russian.) **Trials of Stainless Steel for Use in Injection Needles.** A. T. Nesterenko. *Meditsinskaya Promyshlennost SSSR*, no. 4, 1957, p. 13-18.

Stainless steels studied were 1 Kh. 18N9, 2 Kh. 18N9, 2 Kh. 18NGT, 2 Kh. 18N8V4, 2 Kh. 13n8G4, 2 Kh. 13N4G9 and 2 Kh. 13G16. To determine the mechanical properties and capacity for cold working, steels were drawn with reduction of 10, 20 and 30%. Needles were boiled in water for one day (8 hr. boiling, 16 hr. held on a grid in steam) to determine corrosion resistance. Steel 2 Kh. 18N8V4 gives evidence of possessing superior mechanical and corrosion resistant properties.
(R4, T10e, 17-57; SS)

665-R.* **A Nondestructive Test for Intergranular Corrosion in Stainless Steel.** R. C. Robinson. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM, STP no. 223, 1958, p. 112-118.

Variations in resistivity of sound and corroded samples of tubing allow accurate determination of extent of corrosion.
(R2h, R11, S13h; SS)

666-R.* **Development of Oxidation-Resistant Niobium Alloys.** Harry P. Kling. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 87-91.

Samples of Cb and Cb alloyed with V, Mo or Ti were oxidized in air at elevated temperatures. Results of microscopic, chemical and electrical conductivity studies on oxide scale form basis for discussion of oxidation rate and mechanism. 6 ref. (R1h; Cb-b)

667-R.* **Preliminary Study of the Effect of Binary Alloy Additions on the Oxidation Resistance of Columbium.** Francis J. Clauss and Charles A. Barrett. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 92-97.

Addition elements, Ti, V, Cr, Zr, Mo, Ta, W, Fe, Co, Ni, Ir, Al, Si, Cu, Ge, Se and Re were added singly in 1, 2, 3, 5, 10 and 25 at. % and specimens were fabricated by powder metallurgy. Nature of scale and resistance to oxidation were evaluated by continuous exposure to dried air for 4 hr. at 1000° C. and 2 hr. at 1200° C. (R1h, 2-60; Cb-b)

668-R.* **Oxidation of Columbium-Chromium Alloys at Elevated Temperatures.** Charles A. Barrett and Francis J. Clauss. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 98-105.

Oxidation rates and scale characteristics were determined for Cb alloys containing 0.8 to 11.6 % Cr at 800, 1000 and 1200° C. At 800° C., optimum Cr concentration for soundest scale and lowest oxidation rate was found at 5 to 8%. At 1000° C., scale characteristics and oxidation resistance improved with increasing Cr. At 1200° C., Cr had no appreciable effect in range studied. 12 ref.
(R1h, 2-62; Cb-b, *Cr*)

669-R.* (German.) **Chemical and Electrochemical Aspects of Corrosion in Atomic Piles.** G. H. Cartledge. *Werk-*

stoffe und Korrosion, v. 9, Aug-Sept. 1958, p. 493-503.

Formation of metal-protective film-solution under normal conditions; corrosion reactions caused by the products of nuclear fission. 44 ref. (R1, T11g, 2-67)

670-R.* (German.) **Corrosion and Passivity.** U. F. Franck. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 504-513.

Corrosion processes and passivity in metallic materials are of electrochemical nature. It is possible to show that the passive state is caused by very thin nonmetallic films. These films are characterized by certain properties of electric conductivity. Corrosion behavior of passivated metals is governed by the chemical and electric properties of the films and not by the basic metal. 63 ref. (R10c)

671-R.* (German.) **Protection Against Corrosion.** K. Thalhofer. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 515-517.

Construction of modern cathodic protection installations for old pipelines (water, gas) in densely populated as well as in industrial districts is meeting increasing difficulties. The number of buried pipes makes it necessary to extend the protective installations. (R10d, W13h)

672-R.* (German.) **Intercrystalline Corrosion of Chromium-Nickel Steels.** M. Prazak. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 517-519.

Electrical etching test using saturated calomel electrode for determining passivation potential of grain boundaries. 12 ref. (R2h, 1-54; SS)

673-R.* (German.) **Corrosion of Lead Pipes.** E. L. Schmeling and B. Roeschenbleck. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 529-532.

Pitting of waste water pipes made of Pb always shows identical characteristics. Areas around corroded spots are covered with lead sulphide and basic carbonate. Current density-voltage curves were plotted under various conditions; corrosion potential and corrosion current determined. 8 ref. (R1a, R2j; R4; W13h, Pb)

674-R.* (German.) **Corrosion of Aluminum and Its Alloys.** O. Sverepa. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 533-536.

In river waters corrosion was low and uniform, while there was pitting corrosion in circulating waters. Composition and impurities in the water influence corrosion. Differences between the corrosion behavior of different materials were slight. Al-Mn and Al-Mg alloys were most severely corroded by mutual action of Cu^{++}, Cl', Ca^{++}, HCO_3' in presence of oxygen. Pitting corrosion depends largely on concentration of the ions mentioned. (R4, R2j; Al)

675-R.* (German.) **Passivation of Zinc.** L. Cerveny. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 543-547.

An effective passivating agent is the vapor of tertiary butanol chromate. A temporary action passivates the metal and decreases the velocity of corrosion. Resistance to corrosion depends on duration of the action of the passivating agent. In the reaction between Zn and the vapors of tertiary butanol chromate, the partial pressure of the air determines velocity of passivation. 6 ref. (R10c; Zn)

676-R.* (German.) **Influence of Dust on the Atmospheric Corrosion of Metals.** K. Barton. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 547-549.

Properties of several natural and artificial dusts which may influence corrosion processes. Absorption capacity for water vapor and sulphur dioxide and influence of soluble components; composition of dusts and their pH-value. Corrosion tests on unprotected steels, Cu, Zn and Al in presence and absence of sulphur dioxide at different humidities were carried out in presence of dust. (R3, R11)

677-R.* (German.) **Measurement of Intercrystalline Corrosion by Resonance Vibration.** K. Smrcek. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 550-552.

A specimen showing intercrystalline corrosion is subjected to the vibrations of a magnetic exitor which is fed by an amplified vibration generator. When the frequency of resonance changes according to the degree of corrosive attack, the sound of the specimens changes; this point is also indicated by means of silicon carbide powder which is gathered in the nodal point. (R2h, R11a)

678-R.* (German.) **Diagnosis of the Causes of Corrosion Processes.** G. Schikorr. *Werkstoffe und Korrosion*, v. 9, Aug-Sept. 1958, p. 552-556.

Composition, distribution, color, velocity of dissolution and crystal structure of the corrosion products may indicate the causes of corrosion. Some diagnoses are reliable, others are reliable only under certain conditions. 6 ref. (R-general, R11)

679-R. (Hungarian.) **Lead Alloys for Batteries.** Pesti Laszlo. *Kohaszati Lapok*, v. 12, no. 1-2, 1957, p. 53-57.

The Pb-Sb (6-12% Sb) alloy is not satisfactory because Sb dissolves in H_2SO_4. The replacement of Sb by Cd deserves attention. A Pb alloy with 2% Sb and 1% Cd gives good results. Addition of 0.05-0.1% Te increases strength and corrosion resistance of Pb. Li, 3 or 1%, in combination with K, Na or Rb, also increases the hardness. An alloy containing 0.02% Li, 0.3% Na, 0.05% Ca has tensile strength of 20 kg. per sq. mm. and possesses good corrosion resistance. Beneficial action of As and Ag noted. (R6g, Q27a, Q29n, 2-60, T1; Pb)

680-R.* (Japanese.) **Metal Surfaces and Corrosion.** N. Ohtani. *Metals*, v. 28, Oct. 1958, p. 736-740.

Corrosion is more or less influenced by the valence electrons of metals. Irregularity on the surface induces a local polarization which may accelerate corrosion; polarization potential and hydrogen overvoltage are the most important factors. Impurities and scratches cause most corrosion. (R-general)

681-R.* (Japanese.) **Underground Corrosion and Its Prevention.** H. Okubo. *Metals*, v. 28, Oct. 1958, p. 782-784.

Corrosion is caused by electrolytic reaction. If the specific resistivity of soil is less than 2300, corrosion is more serious. This kind of corrosion is caused by local electric current which depends on the nonuniformity of the surface, contact of two different metals, nonuniformity of soil and bacteria. Protection may be provided by plating with glass coating, enameling, plastic coating and cathodic protection. (R8)

682-R. How Oxidative Corrosion Occurs. Robert V. Jelinek. *Chemical Engineering*, v. 65, Aug. 25, 1958, p. 125-130.

Principles of electrochemical corrosion. (R1a)

683-R. Compound Inhibits the Formation of Tenacious Scale. *Design Engineering*, v. 4, Sept. 1958, p. 63.

New compound inhibiting formation of tenacious scale on stainless steel, Ni-Cr and alloys of Co, Ti and Cu during heat treatment. (R10b, R2q; SS)

684-R. Protection of Iron by Rust Stabilization. *Industrial Finishing (London)*, v. 10, Sept. 1958, p. 47.

By converting rust to stable oxides of iron, "Corroless" provides a priming coat which can be applied direct to the metal without any elaborate cleaning procedure. (L26n, R1h, R2q, R10g; Fe)

685-R. (Japanese.) **Pinholes in Aluminum Pots.** T. Fukushima. *Metals*, v. 28, Sept. 1958, p. 663-664.

Pinholes result when low pH water is boiled, or chloride or sulphide is contained in water. Almite film is a good protector, but thick film is required. (R2j, T10a; Al-b)

686-R. Behavior of Some Aluminum Alloys in a Chromic-Phosphoric Acid Mixture. K. M. Carlsen. *Aluminum*, v. 33, Feb. 1957, p. 101-103. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1504.)

Previously abstracted from original. See item 145-R, 1957. (R6g; Al)

687-R. Selective Corrosion of Zinc. I. I. Zabolotnyi. *Journal of Applied Chemistry of the USSR*, v. 30, (1957), p. 1007-1011. (Translation by Consultants Bureau, Inc.)

Dependence of the selective corrosion of Zn on acid content of the solution, temperature and presence of various oxidants in solutions on nonoxidizing acids. (R6g; Zn)

688-R. On the Oxidation of Titanium. W. Kinna and W. Knorr. *Zeitschrift für Metallkunde*, v. 47, Aug. 1956, p. 594-598. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB15.)

Previously abstracted from original. See item 471-R, 1956. (R1h; Ti)

689-R. (Slovenian.) **Some Data Concerning Corrosion of Chemically Stable and Heat Resisting Steels.** Otmar Gautsch. *Nova Proizvodnja*, v. 8, no. 3-4, 1957, p. 217-221.

Corrosion in salt and fresh water and at some temperatures under various conditions. Influence of heat treatment and alloying on corrosion resistance; connection between steel potential and corrosion resistance. Data on scale formation on heat resisting steels.
(R4a, R4b; ST, SGA-h)

690-R. Oxidation of Copper to Cu_2O + CuO. Donald W. Bridges, John P. Baur, Gretta S. Baur and W. Martin Fassell, Jr. Utah University, Dept. of Metallurgy. *U. S. Office of Technical Services,* PB 126194, Nov. 1955, 17 p. (Available at Library of Congress, Washington, D. C.—Microfilm $2.40; Photostats $3.30.)

Oxygen-free high-conductivity Cu was oxidized to CuO and Cu_2O over the temperature range 600-1000° C. in pure oxygen (0.026-20.4 atm.). Correlation of weight gained and time, also temperature correlation, obtained by mathematical equations.
(R1h; Cu)

691-R. Study of Fundamental Factors Affecting Corrosion of Magnesium Alloys and Adhesion and Protective Effect of Coatings. S. E. Rohowetz. Bjorksten Research Laboratories, Inc. *U. S. Office of Technical Services,* PB 132153, May 1956, 127 p. (Available at Library of Congress, Washington, D. C.—Microfilm $6.30; Photostats $19.80.)

Causes of pitting-type corrosion.
(R2j; Mg-b)

692-R.* (Czech.) **Corrosion Observed in Weldments of Stainless and Heat Resistant Steels.** Josef Nemec. *Zvaranie,* v. 7, July 1958, p. 193-196.

"Knife-cut" corrosion occurs with stabilized 18-8 steels, near the contact line between weld and base metal. Observed under boiling HNO_3, HNO_3 solutions and NaF. Favored by more than 0.08-0.10% C in steel; Ni near upper limit, Cr and Ti or Cb near lower limits; coarse grain at contact line. Reduced by increased Ti or Cb; several welded layers not exposing contact line. Stress-corrosion avoided by choice of steels and relief annealing. Slag from coated electrodes causes corrosion by passing atmospheric O and S to the metal and should be removed by sandblast. 7 ref. (R-general; SS, 7-51)

693-R.* (German.) **Attack of Iron-Saturated Zinc Melts Upon Iron Which Contains Molybdenum.** Dietrich Horstmann. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 463-466.

During the attack of Zn melts upon Fe containing up to 5.25% Mo, the Fe losses and the formation of layers of Fe-Zn alloys are observed in terms of time and temperature. At lower Mo contents the attack upon the Fe is strong, and decreases with Mo content up to 5%. At low and high temperatures the time diagram has parabolic shape; in the intermediate range it is linear. (R6m; Fe, *Zn, Mo*)

694-R.* (German.) **Mechanism of Passivation and Formation of Protective Layers.** Theo Hermann. *Archiv für das Eisenhüttenswen,* v. 29, Aug. 1958, p. 505-512.

Survey of research in the field of passivation; discussion of layers, electrochemical and other measuring methods. The mechanism of formation and decomposition of passive layers on Fe, Ni, Cr, Al and Ti as well as the behavior of Fe-Cr alloys and Cr steels. 33 ref.
(R10c; Fe, Ni, Cr, Al, Ti, AY)

695-R.* (German.) **Resistance to Welding and the Oxidation Behavior of Contact Points Made From Silver-Graphite.** A. Keil and W. Merl. *Metall,* v. 12, July 1958, p. 619-622.

Oxidation behavior of silver-graphite materials is largely dependent on the graphite contents. Doubling the graphite content increases the rate of destruction through burning 10 to 12 times. Therefore, this material is suitable only on bounce-free switch gear. Through double sintering the life of contact points was increased by 100% and more without reducing the resistance against welding. 7 ref.
(R1h; Ag, NM-k36, SGA-r)

696-R.* **Corrosion of Titanium in Sulfuric Acid and Chlorine.** L. W. Gleekman. *Corrosion,* v. 14, Sept. 1958, p. 21-22.

Tests find suitable materials of construction to handle both chlorine gas being dried by sulphuric acid, and sulphuric acid saturated with chlorine. Passivating effect of chlorine in presence of water is apparent mechanism which retards corrosion of Ti in sulphuric acid.
(R6g, R6q; Ti)

697-R.* **A Review of the Gas Condensate Well Corrosion Problem.** D. R. Fincher. *Corrosion,* v. 14, Sept. 1958, p. 23-24.

Corrosion control in wells with shut-in pressure above 5000 psi. Methods of applying inhibitors in

wells include sticks, liquid lubricators, chemical pumps and pump trucks, dump bailers, chemical injection valves in tubing, bottom hole chemical pumps, bottom hole chemical injectors, chemical squeezes. 9 ref. (R10b, T28)

698-R.* Corrosion Resistance of Titanium Alloys Compared With Commercially Pure Titanium. David Schlain and Charles B. Kenahan. *Corrosion,* v. 14, Sept. 1958, p. 25-28.

Ti alloys are similar to commercially pure Ti in chemical and galvanic corrosion properties, and have low corrosion rates. They resist synthetic ocean water, tap water, sodium hydroxide (1%) and ferric chloride (5%) solutions. In aerated sulphuric acid solutions, Ti alloys, except Ti-Cu, are corrosion resistant and vary with temperature and concentration of acid; Ti-Cu alloys are more resistant in sulphuric and less resistant in hydrochloric acid. 7 ref. (R4, R6; Ti-b, Ti-a)

699-R. Effect of the Concentration of Various Salts on the Dissolution of Cadmium in Air-Saturated Solutions. Charles J. Boone and Cecil C. Lynch. *Corrosion,* v. 14, Sept. 1958, p. 29-31.

Initial dissolution rate of Cd in varying concentrations of potassium, sodium and barium chloride, potassium and sodium bromide, potassium and sodium iodide, and sodium and barium perchlorate examined polarographically. Nature of anion had much greater effect on rate than did the nature of cation. Inhibiting action by perchlorate ion and fast corrosion rate of iodide salts are due to anion polarization. 18 ref. (R6j; Cd)

700-R.* Corrosion Behavior of Zirconium-Uranium Alloys in High-Temperature Water. Warren E. Berry and Robert S. Peoples. *Corrosion,* v. 14, Sept. 1958, p. 34-38.

Corrosion increased with increase in water temperature, and oxygen and uranium content. Corrosion behavior determined by amount and distribution of epsilon phase in alloys less than 55% U and alpha phase in alloys greater than 60% U. Increase in corrosion rate in alloys of 45 to 55% U can be correlated with the effect of oxygen on the stability of epsilon phase. Microstructures reveal increase of second phase (alpha Zr) with increasing oxygen content. 13 ref. (R4, 2-61, 3-71; Zr-b, U)

701-R.* Corrosion and Water Purity Control for the Army Package Power Reactor. Richard J. Clark and A. Louis Medin. *Corrosion,* v. 14, Sept. 1958, p. 39-43.

Reactor produces 2000 kw. of electricity, and has a pressurized water system. Primary purification system performance data on individual components. Experimental in-plant equipment for determining crude levels, corrosion rates and other related parameters. Corrosion rate of components has been lower than originally estimated. 4 ref. (R4, T11, W11p)

702-R.* Some Relations Between Deposition and Corrosion Contamination in Low Make-Up Systems for Steam Power Plants. E. S. Johnson and H. Kehmna. *Corrosion,* v. 14, Sept. 1958, p. 49-54.

Mechanism is postulated which indicates that ratios and interactions of contaminants are more significant to deposition than the absolute amount of contaminants. Examples cited. Mechanisms based upon thermodynamics of soluble ions from corrosion of materials of construction can qualitatively account for form and composition of deposits. Trouble from deposits depends on ratio of Cu to Fe rather than the absolute concentrations of either. Small variations in the concentration of other ions are not important. 3 ref. (R4, W11g)

703-R.* Corrosion of Metals in Tropical Environments. Pt. 2. Atmospheric Corrosion of Ten Structural Steels. C. R. Southwell, B. W. Forgeson and A. L. Alexander. *Corrosion,* v. 14, Sept. 1958, p. 55-59.

Tests made by exposure to seashore and inland environments in Panama Canal Zone. Corrosion rates compared with existing data for the same materials in temperate zones. Effects of low-alloy additions on mild carbon steel. Ni and Cr steels were most corrosion resistant, while Cu steel proved slightly better than unalloyed mild steel. Low-alloy steels showed good corrosion resistance. 9 ref. (R3s; AY)

704-R.* Electrochemical Behavior of Aluminum. E. Deltombe and M. Pourbaix. *Corrosion,* v. 14, Nov. 1958, p. 496t-500t.

Potential-pH equilibrium diagram of the system aluminum-water at 25° C. was developed from the standard free energies of the constituents and the general electro-

chemical behavior of Al was deduced from the diagram. Diagram indicates the theoretical circumstances in which Al should show corrosion, immunity, and passivity, under the hypothesis that the passivation results from the formation of a film oxide whose stability resembles that of hydrargillite. 29 ref. (R11m; Al)

705-R.* Corrosion-Resistant Experimental Steels for Marine Applications. C. P. Larrabee. *Corrosion,* v. 14, Nov. 1958, p. 501t-504t.

Six steels having various combinations of Ni, Cu and P tested in sea water for periods of 1, 2 and 5 years and compared with corrosion resistance of structural carbon steel. Decreases in thickness were calculated at 20 different levels for each of the Ni-Cu-P steels. Steel containing 0.5% Ni, 0.5% Cu and 0.12% P had the greatest resistance. (R4b, 2-60; AY, *Ni, Cu, P*)

706-R.* Laboratory and Field Methods for Quantitative Study of Sulfide Corrosion Cracking. J. P. Fraser, G. G. Eldredge and R. S. Treseder. *Corrosion,* v. 14, Nov. 1958, p. 517t-532t.

Test apparatus and procedures for studying sulphide corrosion cracking may have general applications in the broader field of stress-corrosion cracking. A quantitative means of expressing the relative susceptibility to cracking of a specific alloy in a specific environment may be obtained. Influence of a number of test variables such as stress raisers, composition of test solution, time of exposure and type of loading on the "critical strain" determination. 9 ref. (R1d, R7k; SS)

707-R.* Influence of Metallurgical Variables on Resistance of Steels to Sulfide Corrosion Cracking. J. P. Fraser and G. G. Eldredge. *Corrosion,* v. 14, Nov. 1958, p. 524t-530t.

Statistical study of sulphide corrosion cracking as a function of chemical composition, mechanical properties and heat treatment. Of 104 alloy steels studied, 79 were commercially produced API grades J-55, N-80 and P-110 steels. Resistance to cracking is increased most rapidly by increases in ductility and in carbon content. Resistance to cracking is decreased most rapidly by increases in hardness, strength and Mn and Mo content. 9 ref. (R7k; AY)

708-R.* Limitations on Chemical Means of Controlling Corrosion in Boilers. Douglas E. Noll. *Corrosion,* v. 14, Nov. 1958, p. 541t-544t.

Five examples of boiler tube failures caused by corrosion. Iron migration theory. Corrosion can occur despite the use of chemicals in boiler water. Two chemical methods of corrosion control are control of alkalinity and acid cleaning. Under certain operating conditions periodic acid cleaning of boilers is essential if tube failures are to be avoided. 21 ref. (R4c, R10a; ST)

709-R.* Corrosive Influences Peculiar to Sewage. A. G. Arend. *Corrosion Prevention & Control,* v. 5, Aug. 1958, p. 41-42.

Corrosion in sewage pipe lines differs from corrosion in normal water, which contains more oxygen than sewage. Deposits which accumulate on metal surfaces in contact with sewage give no protection. Compounds of chlorine, sulphur and ammonia present in sewage destroy brickwork, concrete and iron. Ventilation facilitates removal of gases and speedy conveyance of sewage helps to prevent corrosion. (R4j)

710-R.* Effect of Surface Active Agents on the Formation of Boiler Scale. G. H. Ireland. *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 57-60.

Mechanism suggested for the formation of the common calcite and anhydrite scales frequently found on heating and cooling surfaces of industrial plant. Types of treatment are compared; advantages of the use of specially developed organic surface active agents. Related compounds, such as anti-foams, oxygen scavengers and neutralizing amines; their applications. (R2q, R4c, R10b)

711-R.* Water Main Protection. *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 63-64.

Technique which makes use of a range of materials developed from petroleum jelly under the trade name Denso. They retain their plasticity indefinitely over a wide range of temperatures. (R10e, T26r)

712-R.* Ships' Bottom Paints in Relation to Cathodic Protection. T. A. Banfield. *Corrosion Technology,* v. 5, Aug. 1958, p. 243-246.

Cathodic protection principles and design of installations including type

and composition of anode materials. Tests prove that non-saponifiable such as vinyl, bituminous materials and some types of synthetic rubbers are the best coatings for bottoms of cathodic protected ships, particularly on areas close to the anodes. 11 ref. (R10d, L26, T22g)

713-R.* Developments in Ships' Protective Coatings. F. Perkins. *Corrosion Technology,* v. 5, Aug. 1958, p. 247-249.

Analysis of sources and mechanisms of corrosion with methods of preventing the electrochemical reaction. Polymers, vinyls, bituminous materials and chlorinated rubber for underwater coatings; top-side paints; primers and paints that give diversity of service and protection. (R4b, T22g, L26)

714-R.* Propeller Corrosion and Cavitation Erosion—Its Prevention by Cathodic Protection. M. G. Duff. *Corrosion Technology,* v. 5, Aug. 1958, p. 250-253.

Sources of trouble from corrosion and cathodic protection systems of various types of vessels. (R10d, T22)

715-R.* Cathodic Protection Under Present Freight Conditions. *Corrosion Technology,* v. 5, Aug. 1958, p. 254-256.

Major tanker companies find cathodic protection economical. Designs and capabilities of cathodic protection system, including spherical collared anodes, used in the deep tanks and on the hulls. (R10d, T22g)

716-R.* Reducing Cathodic Protection Costs in Tankers. L. R. Page. *Corrosion Technology,* v. 5, Aug. 1958, p. 257-259.

Improved technique and design made it possible to modify anode sizes, area-to-weight ratios and anode disposition. Epoxy resin coatings, finned anodes and attachments improved efficiency of cathodic protection in tanks. High-purity Zn anodes automatically regulate current output and are used in protecting the hull and propeller. (R10d, T22g)

717-R.* Corrosion in the Food Industry. J. W. Selby. *Food Manufacture,* v. 33, Oct. 1, 1958, p. 403-410.

Principal corrosive constituents encountered are atmospheric oxygen, organic acids, chlorides, labile sulphur and sometimes sulphur dioxide (used as a food preservative). The 18-8 Cr-Ni steels with Mo show the greatest resistance to most acid chloride conditions and will even give fair service when SO_2 is present. Corrosive behavior of Ni, Monel, Inconel and Sn analyzed. 7 ref. (R7n; SS, Ni)

718-R. Corrosion Behaviors of Plutonium and Uranium. J. T. Waber. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/699, 1958, 31 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Relatively mild attack on both Pu and U by O is accelerated by moisture. If corrosion by H_2O occurs in the absence of O, the attack is even more aggressive than if O is present. 18 ref. (R4; Pu, U)

719-R. Effects of Alloying on the Kinetics of Oxidation of Niobium. W. D. Klopp, C. T. Sims and R. I. Jaffee. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/712. 1958, 39 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Kinetics of the Cb-O and Cb-air reactions investigated at 400-550° C. and 600-1200° C. respectively. Effects of binary additions of V, Mo, Cr, Ti, Zr and W on the Cb-air reaction investigated at 1000 and 1200° C. Weight-gain data were obtained for Cb ternary alloys in air at 600, 800 and 1000° C. 18 ref. (R1h, 2-60; Cb-b)

720-R. High Temperature Aqueous Corrosion of Aluminum Alloys. J. E. Draley, C. R. Breden, W. E. Ruther and N. R. Grant. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/714, 1958, 18 p. Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Corrosion of alloy X8001 in distilled water at various temperatures. From 150 through 290° C., a reasonably good straight line represents the log of the corrosion rate as a function of the reciprocal of the absolute temperature. 8 ref. (R4a, 2-62; Al-b)

721-R.* (English.) Oxidation Rate of Steel and Cast Iron in a Steam Atmosphere. P. Szeki. *Acta Technica,* v. 22, no. 1-2, 1958, p. 129-134.

Based on experiments with cast iron (3.28% C, 0.33% Mn, 1.74% Si, 0.10% S, 0.29% P) exposed to a steam atmosphere at 750° C. and with mild low-carbon steel (0.11 C,

0.39 Mn, 0.23 Si, 0.031 S, 0.031 P) in steam at 650° C.; formulas for the oxidation rate constant are found for each of both materials thought useful in oxide coating. 7 ref. (R4d; Cl-b, CN-g)

722-R.* (German.) **Behavior of Oxide Layers on Metals.** L. Vlasakova. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 536-538.

Effect of the properties of the films—absorption, emissivity, conductivity and diffusion—on the kinetics of surface reactions and corrosion. 4 ref. (R1a)

723-R. Corrosion in Water Engineering. A. W. Neal. *Corrosion Prevention & Control,* v. 5, Oct. 1958, p. 46-48.

Comparison of protective coatings on steel pipes, boilers and cisterns. (R4, R10, T26q; ST, CI, 4-60)

724-R. Study of the Passivity of Metals in Inhibitor Solutions, Using Radioactive Tracers. Pt. 1. Action of Neutral Chromates on Iron and Steel. D. M. Brasher and A. H. Kingsbury. *Faraday Society, Transactions,* v. 54, Aug. 1958.

Using potassium chromate labelled with Cr51, during immersion of steel in chromate solution, logarithmic growth of an oxide film, containing chromic and iron oxides, is seen to proceed in a manner similar to that of oxide film growth in air. 20 ref. (R10c, 1-59; ST)

725-R. Optical Measurement of Film Growth on Silicon and Germanium Surfaces in Room Air. R. J. Archer. *Electrochemical Society,* Abstract no. 70, May 1957, p. 153-161.

Ellipticity of polarized light reflected from the surfaces was measured to obtain film growth rates. (R2r; Ge, Si, 14-61)

726-R. Have You Tried Titanium to Check Corrosion? *Petroleum Engineer,* v. 30, Sept. 1958, p. C-12.

Typical chemical plant applications. (R-general, T29; Ti, 17-57)

727-R. Some Basic Problems of the Formation and Adherence of Scale on Iron. H. Engell and F. Wever. *Acta Metallurgica,* no. 5, Dec. 1957, p. 695-702. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1360.)

(R2q; Fe)

728-R. Oxidation of Steels in Superheated Steam. P. Grobner and Z. Bret. *Hutnicke Listy,* v. 12, no. 2, 1957, p. 125-131. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1361.)

Previously abstracted from original. See item 419-R, 1957. (R4d, R1h; ST)

729-R. Corrosion of Stainless Steels in Solutions Containing Hydrofluoric Acid. M. M. Kurtepov and A. S. Gryaznova. *Trudy Komissii po Bor'be Korroziei Metal Akademii Nauk SSSR, Otdelenie Khimicheskikh,* no. 2, 1956, p. 49-58. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. R-4009.)

(R6g; SS)

730-R. Theory of Underground Corrosion of Metals. N. D. Tomashov. *Uspekhi Khimii,* v. 26, no. 2, 1957, p. 139-163. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-26K22R.)

(R8)

731-R. High-Temperature Corrosion of Metals by Hydrogen Sulphide. K. I. Tseitlin, L. V. Merzloukhova and V. A. Strunkin. *Zhurnal Prikladnoi Khimii,* v. 30, no. 10, 1957, p. 1553-1558. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-48K23R.)

(R7k; 2-62)

732-R. (German.) **Cooperative Experiments on the Standardizing of Corrosion Tests.** W. Wiederholt. *Metalloberflache,* v. 12, Oct. 1958, p. 305-307.

Testing by salt water spray and holding in damp atmospheres (R11)

733-R. (German.) **Steels Resistant to Corrosion by Gases.** V. Cihal. *Werkstoffe und Korrosion,* v. 9, Aug-Sept. 1958, p. 513-514.

Resistance of steel against corrosion by hydrogen depends primarily on the stability of iron carbides. Influence of alloy constituents; a number of W-Ti steels were investigated. (R6q; AY)

734-R.* (Japanese.) **Study of Die Casting of Hydronalium. Pt. 2.** Takuichi Morinaga, Tsuneo Takahashi, Goro Omori and Hiroshi Oba. *Japan Foundrymen's Society, Journal,* v. 30, July 1958, p. 548-553.

Corrosion tests using 3% sodium chloride solution were utilized to determine influence of iron concentration. Corrosion resistance of Al

alloys containing 8% Mg was not affected by 1.3 to 1.8% Fe nor in the case of 2.5% Mg alloys by 0.7 to 0.9% Fe.
(R-general, 2-60; Al-f, *Fe, Mg,* 5-61)

735-R. Oxidation of Tantalum at 50-300° C. D. A. Vermilyea. *Acta Metallurgica,* v. 6, Mar. 1958, p. 166-171.
Thickness of oxide films estimated from electrical capacitances of the films. 14 ref. (R1h, S14c; Ta, 2-61)

736-R. Oxidation of Niobium Between 375 and 700° C. E. A. Gulbransen and K. F. Andrew. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 4-9.
Complex reaction rate varies with temperature; studied by the vacuum microbalance method. 11 ref.
(R1h, 2-62; Cb)

737-R. Action of Lead Pigments and Lead Soaps on Aluminum. M. J. Pryor, R. J. Hogan and F. B. Patten. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 9-17.
Aqueous extracts of metallic Pb and litharge are corrosive due to high pH and to galvanic corrosion resulting from Pb deposition on Al. 22 ref.
(R-general; Al-b. Pb. NM-a, NM-g30)

738-R. Anodic Oxidation of Zinc and Zinc-Tin Alloys at Very Low Current Density. S. E. S. El Wakkad, A. M. Shams El Din and H. Koth. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 47-51.
Formation of Zn hydroxide, stannous and stannic hydroxide and Zn oxide films measured by direct potentiometric method. 13 ref.
(R1h; Zn, Zn-b, *Sn*)

739-R. Anodic Oxidation of Cadmium. Pt. 1. Mechanism of Film Formation. Phyllis E. Lake and E. J. Casey. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 52-57.
6 ref. (R1h; Cd)

740-R. Cathodic Reduction of Oxide Films on Iron. Pt. 2. Determination of Alpha-Fe_2O_3 and Fe_3O_4. K. H. Buob, A. F. Beck and M. Cohen. *Electrochemical Society, Journal,* v. 105, Jan. 1958, p. 74-78.
6 ref. (R10d, M22h; Fe, NM-a34)

741-R. Cathodic Disintegration of Tin. H. W. Salzberg and F. Mies. *Electrochemical Society, Journal,* v 105, Feb. 1958, p. 64-66.
Studies at high current densities in neutral, acid and alkaline solutions. 7 ref. (R-general; Sn)

742-R. Oxidation of an Aluminum 3% Magnesium Alloy in the Temperature Range 200-550° C. W. W. Smeltzer. *Electrochemical Society, Journal,* v. 105, Feb. 1958, p. 67-71.
20 ref. (R1h, 2-62; Al-b, *Mg*)

743-R. Metallographic Manifestations of the Air Oxidation of Tantalum at 750° C. Robert Bakish. *Electrochemical Society, Journal,* v. 105, Feb. 1958, p. 71-74.
Crystallographic and structural factors. 12 ref. (R1h, M26 Ta)

744-R. Reaction Rate Study of the Corrosion of Low Hafnium Zirconium in Aqueous Hydrofluoric Acid Solutions. Tennyson Smith and George Richard Hill. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 117-121.
9 ref. (R6g; Zr-b, *Hf*)

745-R. Metal-Water Reactions. Pt. 6. Kinetics of the Reactions of Water Vapor With Strontium and Barium. Harry J. Svec and H. Gene Staley. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 121-125.
6 ref. (R4d; Sr, Ba)

746-R. Dissolution of Metals in Aqueous Solutions. Pt. 2. Depolarized Dissolution of Mild Steel. A. C. Makrides and N. Hackerman. *Electrochemical Society, Journal,* v. 105, Mar. 1958, p. 156-162.
Cylinders rotated in *2N* HCl solutions containing ferric chloride, benzoquinone and tolu-p-quinone. 22 ref. (R6q, R7; CN)

747-R. Corrosion Inhibition by Organic Amines. Helmut Kaesche and Norman Hackerman. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 191-198.
Corrosion of pure iron in *1N* HCl discussed by the theory of mixed potentials. 15 ref.
(R10b, R7b; Fe-a)

748-R. Local Cell Action During the Scaling of Metals. Pt. 1. Christa Ilschner-Gensch and Carl Wagner. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 198-200.
Tantalum wire partly covered by Ag exposed to iodine vapor at 174° C. Rate of sidewise growth of the AgI layer. 11 ref.
(R2q, Ta, *Ag,* 4-61)

749-R. Corrosion of Anodically and Cathodically Polarized Magnesium in Aqueous Medium. G. R. Hoey and M. Cohen. *Electrochemical Society, Journal,* v. 105, May 1958, p. 245-250.

Effect of current density, pH and temperature. 32 ref.
(R6g, R1h, 2-61; Mg)

750-R. Studies of the Anodic Behavior of Aluminum. John E. Lewis and Robert C. Plumb. *Electrochemical Society, Journal,* v. 105, Sept. 1958, p. 496-506.

Direction of ionic movement; colometry of barrier layer production; specific surface area of Al with variable resolution from 20-100A. 29 ref. (R1h, P15; Al)

751-R. Oxidation Resistance and Fabricability of Molybdenum Nickel Dispersion Alloys. E. I. Bartlett, D. N. Williams and R. I. Jaffee. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 458-463.

Improvement in oxidation resistance by dispersion distribution amount and type of Ni. 6 ref.
(R1h, N1, G17k; Mo-b, *Ni*)

752-R. Intergranular Cavitation in Stressed Copper Nickel Alloys. J. Reid and J. N. Greenwood. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 503-506.

Given strain, larger cavities formed in brass at a lower temperature than in Cu. Tensile deformation. 5 ref.
(R2m, 3-68, 2-62; Cu-b, *Ni, Mg,* Cu-n)

753-R. Studies on the Metallurgy of Silicon Iron. Some Observations on Selective Oxidation. A. U. Seybolt and E. I. Alessandrini. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 507-509.

Oxide films formed on Fe containing 3¼% Si at low oxygen potentials, are identified, and H_2O : H_2 ratios observed. (R1h; Fe-b, *Si, O*)

754-R. Studies of Stress-Corrosion Cracking of Austenitic Stainless Steel. Hugh L. Logan. *Welding Journal,* v. 37, Oct. 1958, p. 463s-467s.

Cracking of 304 austenitic stainless can be produced by stressing sheet tensile specimens to their room-temperature yield strength in a dilute chlorine-nitride solution. A film rupture mechanism for the inception of cracking is postulated. 7 ref. (R1d; SS-e, 4-53)

755-R. Corrosion of Zircaloy-2 Sheet Weldments. R. Stein and R. E. Monroe. *Welding Journal,* v. 37, Oct. 1958, p. 468s-472s.

Fabrication and welding procedures for reactor fuel elements consisting of UO_2 plates jacketed in Zircaloy-2 sheet. The sheet can be welded in air with simple precautions without sacrificing bend ductility or resistance to corrosion in 680° F. water. 6 ref. (R-general, K1d, T11g; Zr-b, 7-51, 4-53)

756-R. (French.) **Kinetics of the Air Oxidation of Iron in the Range 700-1250° C.** J. Paidassi. *Acta Metallurgica,* v. 6, Mar. 1958, p. 184-194.

Scale composed of three continuous, compact layers of Fe_2O_3, Fe_3O_4 and FeO; growth of these layers is parabolic and relative thicknesses remain constant. 17 ref.
(R1h, 2-62; Fe)

SECTION S

INSPECTION and CONTROL

1-S. Procedures for Chemical Analysis of 7% Uranium-Zircaloy. J. Rynasiewicz. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-JR-6, May 31, 1956, 20 p. (CMA)

Procedures for determining U (titrimetrically); Fe (volumetrically); Ni (colorimetrically); Cr (colorimetrically); Sn (polarographically); and N (micro-Kjeldahl). (S11; U, Zr)

2-S. Non-Destructive Tests on 2½-In. Titanium Pipe and Housing for Centrifugual Pump. J. P. Hammond and T. M. Kegley. *U. S. Atomic Energy Commission,* CF-56-10-27, Oct. 4, 1956, 4 p. (CMA)

Titanium pipe considered off grade was evaluated for soundness and surface quality by ultrasonic and radiographic techniques and metallographic examination. Surface defects were found but the pipe (and the housing fabricated from it) were reported otherwise sound. (S13; Ti)

3-S. Determination of Zirconium in Plutonium by Ion Exchange and Spectrography. Roy Ko. Hanford Works. *U. S. Atomic Energy Commission,* HW-51831, Aug. 5, 1957, 9 p. (CMA)

Impurity amount of zirconium can be separated from plutonium by anion exchange of the plutonium nitrate complex. The combined effluent and wash solution is analyzed for zirconium by graphite spark excitation, using cobalt as the external standard. 14 ref. (S11f, S11k; Pu, Zr)

4-S. New Spectrophotometric Determination of Titanium With Sodium Alizarinsulfonate. Hidehiro Goto, Yachiyo Kakita and Michiko Namiki. *Tohoku University, Research Institutes, Science Reports, Series A (Physics, Chemistry and Metallurgy),* v. 9, Aug. 1957, p. 245-252. (CMA)

Method is based on the green color resulting when titanium is introduced into a solution of sodium alizarinsulphonate and $SnCl_2$ in HCl solution. 4 ref. (S11a; Ti)

5-S. (Russian.) **Surface Inspection of Wire Rod by the Magnetic Suspension Method.** E. I. Andreev and V. N. Gulyakova. *Stal',* v. 17, May 1957, p. 456-457.

Method consists of placing the sample in a bath holding magnetic particles in suspension which deposit along imperfections on the surface of the magnetized sample. Rod within the range of 6-8 mm. can be inspected with complete satisfaction as to quality and efficiency. (S13j; ST, 4-55)

6-S. Determination of Antimony in Cast Iron. R. C. Rooney. *Analyst,* v. 82, Sept. 1957, p. 619-623.

Sample is dissolved in nitric acid under controlled conditions. 12 ref. (S11j; CI, *SG*)

7-S. Volumetric Determination of Tin in Titanium and Its Alloys. H. J. G. Challis and J. T. Jones. *Analyst,* v. 82, Oct. 1957, p. 658-663. (CMA)

5 ref. (S11j; *Sn,* Ti)

8-S. Determination of Boron in Titanium Alloys by Ion Exchange Method. E. G. Newstead and J. E. Gulbierz. *Analytical Chemistry,* v. 29, Nov. 1957, p. 1673-1674. (CMA)

12 ref. (S11f; *B,* Ti)

9-S. Uses of Statistical Methods for Ultrasonic Inspection Problems. M. J. Bratt. *Nondestructive Testing,* v. 15, Sept.-Oct. 1957, p. 282-287.

Basic concepts of statistics and use of statistical methods in analyzing data in typical problems. (S13g, S12)

10-S. Relative Advantage and Limitation of Nondestructive Testing Methods. L. vanOuwerkerk. *Nondestructive Testing,* v. 15, Sept-Oct. 1957, p. 298-312.

Includes radiography, ultrasonics and magnetic particle penetrant methods. (S13)

11-S. (German.) **Determination of Silicon in Steel and Cast Iron Wire. New Filter and Combustion Sleeves.** Gisela Lingelbach. *Giessereitechnik,* v. 3, June 1957, p. 133-134.

(S11, ST, CI, *Si,* 4-61)

12-S. (German.) **Crankshaft Strength.** A. Theodor Wuppermann. *Stahl und Eisen,* v. 77, Aug. 22, 1957, p. 1117-1122.

Longitudinal surface defects are detected by nondestructive tests. 4 ref. (S13, T21c)

13-S. (German.) **Additional Data on the Gas Content of Lead.** Wilhelm Hofmann and Jürgen Maatsch. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, July 1957, p. 313-317.

Degassing of lead under vacuum resulted in gas contents of 1/10 NM1/100 g. melted material. The gas consisted mainly of steam and CO_2, which are formed by a reaction of carbon and hydrogen penetrating from the outside and oxygen in the melt. 14 ref. (S11r, E25s; Pb)

14-S. Micro Volumetric Determination of Uranium With Application to Bismuth Base Alloy Analysis. G. W. C. Milner and G. A. Barnett. *Analytica Chimica Acta,* v. 17, Aug. 1957, p. 220-225.

Macro volumetric method for the determination of U by titration against standard ceric sulphate after reduction on a Pb column has been successfully applied on the micro scale to analysis of Bi-base alloys containing U in concentrations from 0.005 to 0.1% by weight. 5 ref. (S11d; *U,* Bi)

15-S. Ion Exchange Separations in the Anaylsis of Bismuth Base Alloys. Pt. 1. Binary Alloys With Uranium and Thorium. G. W. C. Milner and J. W. Edwards. *Analytica Chimica Acta,* v. 17, Aug. 1957, p. 259-263.

Separation and reduction techniques are supplemented by volumetric and absorptiometric procedures for determination of U (0.001-10%) + Th (0.05-10%) in binary mixtures with Bi. 7 ref. (S11f; U, Th, *Bi*)

16-S. Titanium Arc Furnace Operation Controlled by Atomic Radiations. *Industrial Heating,* v. 24, Oct. 1957, p. 2018, 2026. (CMA)

Gamma rays are being used to detect and control the level of molten titanium in a "cold hearth" arc furnace; a needle of Co-60 is the source of gamma-rays which pass through the ingot. (S18q, W18s; Ti, *Co*)

17-S. Radioisotopes: Use Them on Tough Problems. C. M. Crompton. *Iron Age,* v. 180, Oct. 17, 1957, p. 111-114.

Radioisotopes find application in sheet, strip and film gaging, flaw detection and basic research. (S13, S14, A9; 14-63)

18-S. Application of Static Switching in the Steel Industry. D. L. Pierce. *Iron and Steel Engineer,* v. 34, Nov. 1957, p. 113-125.

Instrumentation and control in steel mills. (S16, S18, W23; ST)

19-S.* SNT Airframe Committee Report on Reproducibility of Ultrasonic Inspection Test Results. Z. J. Varney and R. E. Kleint. *Nondestructive Testing,* v. 15, Sept-Oct. 1957, p. 290-292.

Results of ultrasonic detection and evaluation tests for defects in 7075 Al alloy plate performed by 27 different organizations. (S13g; Al)

20-S. Status Report on Core-3 Hafnium Control Rods. E. D. Baugh and H. B. Hunter. Westinghouse Atomic Power Division, *U. S. Atomic Energy Commission,* WAPD-FEM-60, Feb. 11, 1955, 9 p. (CMA)

Control rods were fabricated of Hf ingots and studied to determine the source and result of contamination. Welding was the source of about 750 ppm. w; Ni is a minor impurity. Contaminated platelets are more likely to crack in cold rolling. (S13, T11j; Hf)

21-S. Determination of Tin in Zirconium-Base Alloys. T. C. Bryson, et al. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-CTA(GLA)-371, Apr. 18, 1957, 4 p. (CMA)

(S11j; *Sn,* Zr)

22-S. Leak Prevention—Through In-Process Leak Detection. Richard P. Turner. *Welding Journal,* v. 36, Dec. 1957, p. 1167-1171.

Use of fluorescent penetrants and fluorescent additives in tank and vessel inspection. (S13, T26q)

23-S. (Pamphlet.) **Steel Products Manual: Steel Tubular Products.** 155

p. Sept. 1957. American Iron and Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Dimensions, tolerances, chemical analysis, nomenclature and sampling of steel tubing, stainless steel tubing and steel pipe.
(S22; ST, SS, 4-60)

24-S. (Pamphlet.) **Steel Products Manual: Hot Rolled Carbon Steel Strip.** 26 p. Oct. 1957. American Iron and Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Dimensions, tolerances, chemical analysis, nomenclature and sampling of hot rolled carbon steel strip.
(S22; CN, 4-53, 1-66)

25-S. (Pamphlet.) **Steel Products Manual: Cold Rolled Carbon Steel Strip.** 27 p. Oct. 1957. American Iron and Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Dimensions, tolerances, chemical analysis, nomenclature and sampling of cold rolled carbon steel strip.
(S22; CN, 4-53, 1-66)

26-S. (Pamphlet.) **Steel Products Manual: Tin Mill Products.** 34 p. Oct. 1957. American Iron and Steel Institute, 150 E. 42nd St., New York 17, N. Y.

Dimensions, tolerances, chemical analysis, nomenclature and sampling of tin plate, black plate, terne plate, blued plate and hollow-ware enameling stock. (S22, ST, *Sn,* 8-62, 8-66)

27-S. (Czech.) **Control and Recording of Temperatures During Pouring and Solidification of Steel.** Lubomir Smrha and Rostislav Hluzin. *Hutnické Listy,* v. 12, 1957, p. 711-714.

Good result in measuring liquids and solidifying steel temperatures obtained with Pt-Rh thermocouple in protective quartz capillary tubes; mechanical high-speed recorder used for recording temperatures.
(S16j, X9q; ST)

28-S. (Czech.) **List of Terms Connected With Spectroscopic Analysis and Their Equivalent in Czech, Russian, German, Polish, French and English.** Josef Kuba. *Hutniké Listy,* v. 12, 1957, p. 715-718.

(S11k; 11-67)

29-S. (French.) **Applications of Radioactivity in the Light Industry.** F. Rohner. *Aluminium Suisse,* v. 5, Sept. 1957, p. 174-181.

Applications of radiotracers and autoradiography. Nondestructive tests; analysis by activation. Proportional Geiger-Muller counters are more and more employed for measuring radiation.
(S19, X8, X2; Al, Mg)

30-S. (German.) **Determination of Small Amounts of Titanium in Iron Alloys and Ores After Separation of the Heavy Metals by Pyrrolidinedithiocarbamate.** Ernst Schoeffmann and Hanns Malissa. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 623-624. (CMA)

(S11; *Ti,* Fe)

31-S. (German.) **Rapid Photometric Determination of Titanium in Copper Alloys.** H. Wiedmann. *Metall,* v. 11, Nov. 1957, p. 942-943. (CMA)

2 ref. (S11a; Au, *Ti*)

32-S.* (German.) **Rimming Steel.** Hubert Hoff, Georg von der Dunk and Heinz Lessing. *Stahl und Eisen,* v. 77, Sept. 1957, p. 1210-1215.

Determination of the nonmetallic inclusions in steel ingots made from rimming-type, free-cutting steel.
(S13b, D9p, G17k; 2-60; ST-d)

33-S. (German.) **Automatic Testing of Billets by Magnetic and Ultrasonic Methods.** Vladimir Husarek. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1483-1487.

Experimental assembly for testing steel billets simultaneously by electromagnetic and ultrasonic methods; applications in a wire rod mill; results with billets rolled from basic bessemer low-carbon steel. Design of an automatic testing assembly.
(S13g, S13h; CN-g, 4-52, 4-55)

34-S. (German.) **Spectormetric Analysis of Steel.** Gerhard Hartleif. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1497-1499.

Determination of C, P, S and gases in steel; sample preparation; excitation; selection of the spectrum lines; optical stability of the apparatus; evaluation. 7 ref. (S11k; ST)

35-S. (German.) **Indirect Volumetric Determination of Molybdenum With Ethylenediamine Tetraacetic Acid.** E. Lassner and H. Schlesinger. *Zeitschrift für Analytische Chemie,* v. 158, no. 3, 1957, p. 195-198. (CMA)

4 ref. (S11j; *Mo*)

36-S. (Japanese.) **Inspection of Aluminum Slab by Supersonic Waves.** T. Morinaga and T. Takahashi. *Casting Institute of Japan, Journal,* v. 29, July 1957, p. 508-514.

Location of large blisters on rolled and annealed plate. (S13g; Al, 9-71)

37-S. (Japanese.) **Preparation of Sample for Chemical Analysis of Sponge**

Titanium. Kazukiyo Ohashi, Tsuyoshi Nakayama and Kameji Shimasaki. *Japan Analyst,* v. 6, Sept. 1957, p. 572-579. (CMA)

(S12h, S11; Ti, 6-74)

38-S. (Spanish.) **Determination of Small Amounts of Aluminum in Titanium.** M. E. Bertin and A. H. Guerrero. *Associacion Quimica Argentina, Annales,* v. 45, June 1957, p. 121-125. (CMA)

7 ref. (S11j; *Al,* Ti)

39-S. **Inspection of Electrodeposits.** N. A. Tope. *Inspection Engineer,* v. 21, July-Aug. 1957, p. 74-79.

Thickness and thickness tests; "strip and weigh" method, time of gassing tests, B.N.F. jet test method, nondestructive tests, microscopic examination. (To be continued.) (S13, S14, 8-62)

40-S.* **Use of Phytic Acid in the Analytical Chemistry of Thorium.** A. I. Ryabchikov, V. K. Belyaeva and A. N. Ermakov. *Journal of Analytical Chemistry of the U.S.S.R.,* v. 11, Nov-Dec. 1956, p. 705-714. (Translated by Consultants Bureau, Inc.)

Technique for quantitative determination of Th in monazite concentrates based on precipitations of Th from 6 *N* (by volume) nitric acid in the presence of oxalic acid. 56 ref. (S11j; Th)

41-S.* **Organic Coprecipitants (Collectors). Pt. 7. Coprecipitation of Bismuth. Determination of Small Amounts of Bismuth in Alloys Based on Cr and Ni.** V. I. Kuznetsov and L. I. Papushina. *Journal of Analytical Chemistry of the U.S.S.R.,* v. 11, Nov-Dec. 1956, p. 733-735. (Translatetd by Consultants Bureau, Inc.)

During precipitation of the sparingly soluble iodide of methyl violet, quantitative removal of any Bi contained in the solution, down to dilutions of $1{:}1{\cdot}10^8$, from the precipitate, occurs. Ni and Cr are not attracted into the precipitate. Method for determining small amounts of Bi in Cr-Ni steels, based on separation of Bi by coprecipitation with methyl violet iodide, with subsequent colorimetric determination as the iodide complex. 6 ref. (S11j; AY, *Bi*)

42-S.* **Bismuthate Method for Determining Chromium in Steels Not Containing Vanadium.** P. F. Agafonov. *Journal of Analytical Chemistry of the U.S.S.R.,* v. 11, Nov-Dec. 1956, p. 811-812. (Translated by Consultants Bureau, Inc.)

Simple method for rapid determination of Cr in steels via oxidation of Cr in sulphuric acid media; excess Bi is reduced directly in solution with potassium (sodium) chlorides. (S11; AY, *Cr*)

43-S. **Standards for Aluminum.** A. W. Halford. *Standards Engineering,* v. 9, Aug-Sept. 1957, p. 4-6.

Development of Al alloy designations; national and international standardization of light metal specifications; pernicious effect of proprietary customer specifications. (S22; Al)

44-S. **Determination of Nitrogen in Zirconium.** E. L. Shirley and G. R. Smith. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-ELS-4, June 6, 1956, 5 p. (CMA)

(S11a; *N,* Zr)

45-S. **Analysis of Samarium Oxide in 304 Stainless Steel-Samarium Oxide Cermets.** V. F. Consalvo and J. Rynasiewicz. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission,* KAPL-M-VFC-1, June 14, 1956, 6 p. (CMA)

(S11; *Sm,* SS; 6-70)

46-S. **Determination of Nitrogen in Zirconium and Zirconium-Base Alloys.** G. J. Harter, A. W. Perrine and J. F. Rodgers. Westinghouse Atomic Power Division. *U. S. Atomic Energy Commission,* WAPD-CTA(GLA)-170, Apr. 18, 1957, 6 p. (CMA)

(S11a; *N,* Zr)

47-S. **A Spectrophotometric Investigation of Vanadium (V) Species in Alkaline Solutions.** Leonard Newman, et al. National Lead Co. *U. S. Atomic Energy Commission,* WIN-55, June 10, 1957, 41 p. (CMA)

Fundamental quantitative data on the mechanism by which V interacts with U in alkaline carbonate solutions. Such information is important for an understanding of the precipitation of U and V from leach liquor. 34 ref. (S11k, C19n; U, V)

48-S. (German.) **Determination of Antimony in Ores and Concentrates.** J. Dolezal and P. Beran. *Czechoslovak Chemical Communication, Collection,* v. 22, June 1957, p. 727-731.

7 ref. (S11m; Sb, *Cu, Bi,* RM-n)

49-S. (German.) **Standardization of Thin Plates.** G. Oehler. *Feinwerk Technik,* v. 61, Aug. 1957, p. 280-286.

Various proposals for changes in German standards for thin plates. (S22, 4-53)

50-S. (German.) **Rapid Method for Determination of Cr_2O_3 and SiO_2 in Chromium Ores.** H. Sövegjatro. *Radex Rundschau,* no. 4, July 1957, p. 668.

(S11b; Cr, RM-n)

51-S. (German.) **Relation Between Specific Weight and Chemical Composition of Chromium Ores.** F. Trojer. *Radex Rundschau,* no. 4, July 1957, p. 671-672.

(S11b; Cr, RM-n)

52-S. (German.) **Determination of Gases in Metals With Special Consideration of Hydrogen in Aluminum.** F. Rabner. *Schweizer Archiv,* v. 23, Aug. 1957, p. 243-248.

Historical and modern methods and equipment. 32 ref. (S11r; Al, *H*)

53-S. (German.) **Measurement of Mechanical Tension in an Elastic Field by Means of the Magneto-Elastic Effect.** Gotthold Bubenzer. *VDI Zeitschrift,* v. 99, Sept. 1, 1957, p. 1215-1217.

Testing of a continuously welded rail. (S13h, T23q; ST)

54-S. (German.) **Inspection With X-Ray Image Intensifier.** Gerhard Lang. *VDI Zeitschrift,* v. 99, Sept. 1, 1957, p. 1227-1231.

Examination of very thick workpieces is possible where regular luminescent screen is not applicable. Picture brightness during X-ray of steel sheets is sufficient for a TV telecast. 4 ref. (S13e, X8g; ST)

55-S. (Japanese.) **Photometric Determination of Small Amounts of Nickel in Ores.** Kiyoshi Isono. *Japan Analyst,* v. 6, Sept. 1957, p. 557-561.

(S11a; Ni, RM-n)

56-S.* (Spanish.) **Determination of Small Amounts of Germanium.** A. Fernandez Segura, A. A. Garmendia and E. L. Pella. *Asociacion Quimica de la Argentina, Anales,* v. 45, June 1957, p. 126-135.

Method for quantitative determination of Ge in the range between 10 and 30 gammas per liter, in an approximate 2*N* zinc sulphate solution. 13 ref. (S11; Ge)

57-S.* (Portuguese.) **Study on the Quality of Steel Elevator Cables.** Karl Ehrenberg. *ABM, Associacao Brasileira de Metais, Boletim,* v. 13, July 1957, p. 267-282.

Studies made at plant of Elevadores Atlas, S. A., on samples of cable supplied by European, North American and Brazilian manufacturers. "Life tests" were carried out in test tower under simulated operating conditions to determine characteristics necessary to satisfactory length of service. (S21, T7g; ST)

58-S.* **Ultrasonic Testing of Aluminum Alloys.** William L. Fink. *ASTM Bulletin,* no. 226, Dec. 1957, p. 36-42.

Acceptance standards should be based on a zoning principle that requires the most rigid standards for the extremely small critical regions in which there are high stress concentrations and in which the plane of the discontinuity lies perpendicular to the direction of loading. (S13g; Al)

59-S. **An Investigation of a Method for the Combined Determination of Niobium and Tantalum in Steel.** *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 341-343.

Procedure provides for the presence of W, Ti and Mo and by a slight adjustment of conditions, the W precipitate could be made quantitative and simultaneous determination made. (S19j; ST, *Cb, Ta*)

60-S. (Czech.) **Standardization of Metallurgical Installations and Construction.** Josef Kopechy. *Hutnické Listy,* v. 12, Oct. 1957, p. 865-877.

4 ref. (S22)

61-S. (Czech.) **Furnace Standardization.** Rudolf Bures. *Hutnické Listy,* v. 12, Oct. 1957, p. 883-887.

Standards for oil and gas-fired furnaces. (S22, 1-55)

62-S. (English.) **Spectrographic Determination of Microamounts of Arsenic, Antimony, Bismuth, Tin and Lead.** Yu Yokoyama. *Tohoku University, Science Reports of the Research Institutes,* v. 9, Oct. 1957, p. 419-425.

3 ref. (S11k; As, Sb, Bi, Sn, Pb)

63-S. (German.) **Acceptance Testing of Materials.** Rudolf Schinn. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1674-1686.

Relation between specification, testing and acceptance. Description of tests. 16 ref. (S22, S13; ST)

64-S. (German.) **Microscopic Examination of Impregnated Porous Minerals.** Josef Cloth. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1691-1692.

(S11e; RM-n)

65-S. (Japanese.) **Segregation in Castings. Report No. 6.** Kazuo Yasuda. *Casting Institute of Japan, Journal,* v. 29, Sept. 1957, p. 648-656.

Spectrographic study. 4 ref. (S11k, 5-60, 9-69)

66-S.* (Russian.) **Service of P-65 Rails in Railroad Tracks.** N. P. Kondakov. *Stal'*, v. 17, Aug. 1957, p. 722-724.

Results of five-year field test of heavy rails. Analysis of defects. High percentage of rail replacement was due to poor mechanical processing in manufacture of the rails. 3 ref. (S21, S13, T23q; ST)

67-S. (Russian.) **Pure Metal Analysis. Determination of Arsenic.** V. A. Nazarenko, G. V. Flyantikova and N. V. Lebedeva. *Zavodskaya Laboratoria*, v. 23, Aug. 1957, p. 891-896.

Determination of As in pure Sb, Cb, V, Si, Ga and Tl. 5 ref. (S11j; *As*, Sb, Cb, V, Si, Ga, Tl)

68-S. (Russian.) **Comparative Evaluation of Gas Determination Methods in Steel.** Yu. A. Klachko, L. L. Kunin and E. M. Chistyakova. *Zavodskaya Laboratoria*, v. 23, Aug. 1957, p. 905-907.

(S11r; ST)

69-S. (Russian.) **Chromoxan, Pure Blue "B" as a Reagent for Aluminum.** F. R. Sheryanova and V. P. Malenskaya. *Zavodskaya Laboratoria*, v. 23, Aug. 1957, p. 907-909.

A new, more sensitive photocolorimetric method of aluminum determination. 5 ref. (S11a; Al)

70-S. (Russian.) **Accelerated Method of Blast Furnace Slag Analysis.** P. I. Protsenko. *Zavodskaya Laboratoria*, v. 23, Aug. 1957, p. 911-912.

Complete analysis in 20 min. (S11j; RM-q)

71-S. (Russian.) **Application of Photometric Method to Investigation of Steel Cracks.** E. N. Krasilshchikov and E. N. Shvach. *Zavodskaya Laboratoria*, v. 23, Aug. 1957, p. 959-961.

(S13d, 9-22; ST)

72-S. Electrochemical Marking of Metal. Ralph A. Botoran: *Machinery*, v. 91, Oct. 11, 1957, p. 861-862.

Advantages and techniques. (S10a)

73-S. Photometric Determination of Tungsten in Steel and Titanium Alloys With Dithiol. Lawrence A. Machlan and John L. Hague. *National Bureau of Standards, Journal of Research*, v. 59, Dec. 1957, p. 415-420.

Method provides accuracy of 0.005% W, or better, in range of 0.05 to 0.50% W, and of about 0.001% for amounts of less than 0.05% W. (S11a; *W*, ST, Ti)

74-S. Sparking Characteristics and Safety Hazards of Metallic Materials. H. Bernstein. U. S. Naval Gun Factory. *U. S. Office of Technical Services*, PB 131131, Apr. 1957, 36 p. $1.

Fundamentals of sparking theory and methods of spark testing. (S10n, A7)

75-S. Use of Ultrasound for Study of the Structure of Steels. L. G. Merkulov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 6, 1957, p. 1387-1391. (Henry Brutcher Translation no. 4057, Altadena, Calif.)

Testing large steel components for completeness of through-hardening; determination of the mean grain size; testing forgings for quality. (S13g; ST)

76-S. (Russian.) **Application of Electrolytically Obtained Permanganate Ion in Coulometric Titration.** O. A. Songina, N. G. Kemeleva and M. T. Kozlovskii. *Zavodskaya Laboratoria*, v. 23, Aug. 1957, p. 896-900.

8 ref. (S11j; Fe, Mn)

77-S. (Russian.) **Separation of Molybdenum From Iron, Aluminum and Calcium by Means of Ion-Exchanging Resins.** Yu. V. Morachevskii and M. N. Gordeeva. *Zavodskaya Laboratoria*, v. 23, Sept. 1957, p. 1066-1067.

5 ref. (S11f; Mo, Al, Fe)

78-S. (Russian.) **Separation of Gallium From Lead and Cadmium Applying Ion Exchange Method.** E. P. Tsintsevich and G. E. Nazarova. *Zavodskaya Laboratoria*, v. 23, Sept. 1957, p. 1068-1070.

7 ref. (S11f; Ga, Pb, Cd)

79-S. (Russian.) **Measuring Surface Finish of Parts Made of Soft Alloys by Induction Profile Meter.** V. M. Kiselev. *Stanki i Instrument*, v. 28, Sept. 1957, p. 35-37.

(S15c)

80-S. (Pamphlet.) **Steel Products Manual: Carbon Steel Sheets.** 68 p. Nov. 1957. American Iron and Steel Institute, 150 East 42nd St., New York 17, N. Y.

Description of grades and qualities of carbon steel sheets to aid the purchaser in selecting the proper steel for a given use. (S22, 15-70; CN, 4-53)

81-S. (Pamphlet.) **Tentative Specifications for Copper and Copper-Alloy Arc-Welding Electrodes. ASTM Designation B22-57T, AWS Designation A 5.6-57T.** 1957. American Welding Society, 33 W. 39th St., New York 18, N. Y. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 11 p. $.40.

For the first time two types of stranded aluminum-bronze electrodes (ECuAl-A2 and ECuAl-B) and one type of aluminum-bronze electrode (ECuAl-A2) for use with the submerged arc process are covered. (S22, 15-68, W29h; Cu, Al)

82-S. (Pamphlet.) **Tentative Specifications for Copper and Copper-Alloy Welding Rods. ASTM Designation B259-57T, AWS Designation A 5.7-57T.** 2nd Ed. American Welding Society, 33 W. 39th St., New York 18, N. Y. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 13 p. $.40.
(S22, 15-68, W29h; Cu)

83-S. Ultrasonic Inspection Makes Turbine Forgings Safer. Robert N. Hafemeister. *American Machinist,* v. 101, Dec. 30, 1957, p. 85-89.
(S13g, 4-51)

84-S. Determination of Tellurium in Lead and Lead Alloys. N. W. Fletcher and R. Wardle. *Analyst,* v. 82, Nov. 1957, p. 743-746.
5 ref. (S11f; Pb, *Te*)

85-S. Determination of Bismuth in Lead and Lead Alloys. N. W. Fletcher and R. Wardle. *Analyst,* v. 82, Nov. 1957, p. 747-750.
7 ref. (S11a; Pb, *Bi*)

86-S. Spectrochemical Determination of Lead in Steel. L. C. Flickinger, E. W. Polley and Frank A. Galletta. *Analytical Chemistry,* v. 29, Nov. 25, 1957, p. 1778-1779.
(S11k; ST, *Pb*)

87-S. Determination of Oxygen in Titanium and Titanium Alloys, Based on the Principle of Chlorination. W. T. Elwell and D. M. Peake. *Analyst,* v. 82, Nov. 1957, p. 734-742.
22 ref. (S11b; Ti, *O*)

88-S. Determination of Oxygen in Niobium. W. R. Hansen and M. W. Mallett. *Analytical Chemistry,* v. 29, Nov. 25, 1957, p. 1868-1869.
(S11r; Cb, *O*)

89-S. Determination of Uranium Dioxide in Stainless Steel. X-Ray Fluorescent Spectrographic Solution Technique. Louis Silverman, William W. Houk and Lavada Moudy. *Analytical Chemistry,* v. 29, Dec. 1957, p. 1762-1764.
6 ref. (S11p; SS, *U*)

90-S. Quality Control of Welded Steel Pipe. *Canadian Metalworking,* v. 20, Dec. 1957, p. 10-12.
(S13, F26p, 9-57; ST)

91-S. The Silver Reductor. Its Usefulness in the Assaying of Copper, Iron and Uranium. J. L. P. Wyndham. *Canadian Mining Manual,* 1957, p. 143-147.

Novel method of reducing Fe, Cu and U in certain solutions has wide application in any laboratory conducting assays in batch quantities. Method is particularly apt when poisonous effects of mercuric chloride are a problem, or where there is difficulty in procuring reagents. 4 ref. (S11s; Cu, Fe, U)

92-S. Eddy Currents That Tell the Thickness. Ants Piip. *Design Engineering,* v. 3, Dec. 1957, p. 50-54.
(S14h)

93-S. Strip Mill Control. *Iron and Steel,* v. 31, Jan. 1958, p. 8-10.

Nucleonic thickness gage automatically governs screw-down at D. F. Taylor and Co., Ltd.
(S14e, F23; ST)

94-S. Mass Spectrometric Examination of Anode Gases From Aluminum Reduction Cells. Jack L. Henry and R. D. Holliday. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1384-1385.

Anode gas samples taken from commercial Al reduction cells of both pre-baked anode and continuous or Soderberg anode types. 8 ref. (S11r, C23; Al)

95-S. Method of Surface Analysis and Its Application to Reduced Nickel Powder. M. W. Roberts and K. W. Sykes. *Royal Society, Proceedings,* Series A, v. 242, Nov. 1957, p. 534-543.

Determination of nature of impure metal surfaces by comparing their adsorptive properties with those of the pure metal. 26 ref.
(S11g; Ni, 6-68)

96-S. (French.) **Standardized Tolerances for Steel Work Pieces Produced on Horizontal Forging Machines.** Jean Jusson and Henri Liotard. *Metallurgie et la Construction Mecanique,* v. 89, Nov. 1957, p. 927-933.

Operation of forging machine and some of the shapes it can produce; dimensional variations of pieces obtained; announcement of publication of Standard NF 105 covering machining allowances.
(S22, F22; ST)

97-S. (German.) **Determination of Boron Traces in Light Metal Alloys of High Silicon Content.** Christian Scharrnbeck. *Chemische Technik,* v. 9, July 1957, p. 416-418.
24 ref. (S11j; EG-a39, *Si, B*)

98-S.* (Russian.) **Analysis of Pure Metals.** V. A. Nazarenko. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1162-1167.

Determination of micro-impurities in metals may be made with a sensitivity of 10^{-6}%. The following three methods are generally used: radioactivization, spectroscopy including flame photometry, and chemical analysis, which in its last stages may resort to colorimetry, or polarography. Application and accuracy of each of these methods. 44 ref. (S11)

99-S. (Russian.) **Radiochemical Methods of Analysis in the U.S.S.R.** I. P. Alimarin. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1168-1171.

(S11q)

100-S. (Russian.) **Flaw Detection in Metals.** S. T. Nazarov. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1230-1234.

(S13)

101-S. (German.) **Penetration Power of Radioactive Isotopes.** Hermann Möller and Helmut Weeber. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 543-546.

Penetrating tests were carried out on metal thicknesses from 15 to 160 mm. with In-192, Cs-137 and Co-60. From 15 to 60 mm. Indium proved to give best picture qualities. From 50 mm. upward, Co is most efficient since it warrants shorter exposive times than the other two isotopes. Cesium radiation is not superior. 8 ref.
(S13e; *In, Cs, Co,* 14-63)

102-S. (German.) **Electrochemical Fundamentals of the Isolation of Steel Components.** Walter Koch and Heinz Sundermann. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 557-566.

The electrolytic analysis of steel by component can be performed with a new apparatus, permitting the representation of current density in relation to the potential in diagrams. 11 ref. (S11g, 1-53; ST)

103-S. (German.) **Application of Mathematical Statistics to Problems in the Iron and Steel Industry.** Kurt Orths. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 14-21.

30 ref. (S12; A4, ST)

104-S. (Russian.) **Precipitation to Obtain Concentrates of Cd, Pb, Bi and Zn During Analysis of Alloys.** A. K. Babko and P. V. Marchenko. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1278-1283.

Analysis of heat resistant alloys of Ni, Mo or W. Pyridine and a slow-acting precipitant thioacetamide were used to obtain the needed conditions for precipitation. 4 ref. (S11f; SGA-h, Mo, Ni, W)

105-S. (Russian.) **Analysis of Pure Metals.** V. A. Nazarenko and M. B. Shustova. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1283-1286.

Determination of Ta in Zr and Cb. (S11; *Ta,* Zr, Cb)

106-S. (Russian.) **Amperometric Titration of Indium Complex.** V. M. Vladirimova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1286-1289.

4 ref. (S11j; In)

107-S. (Russian.) **Determining Copper and Zinc Content of Alloys by Amperometric Titration With Rotating Platinum Micro-Electrodes.** V. A. Khadeev and A. K. Zhdanov. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1290-1291.

(S11j; Cu, Zn)

108-S. (Russian.) **Determining the Carbide Content in Corrosion Resistant Steels by Electrolysis.** M. M. Shapiro. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1292-1294.

5 ref. (S11g; SS, *C*)

109-S. (Russian.) **Determination of Sulphur Content of Various Materials by Reduction With Para Zinc.** M. S. Kurchatov. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1294-1296.

8 ref. (S11; S, *Zn*)

110-S. (Russian.) **Complexometric Method of Determining Calcium and Magnesium in Iron Ore.** O. V. Datsenko. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1296-1298.

(S11g; RM-n, Fe, *Ca, Mg*)

111-S. (Russian.) **Contemporary Status of the Analytical Chemistry of Beryllium.** V. G. Goryushina. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1300-1307.

Review of literature. Analysis of minerals; separation of Be from other metals; volumetric determination of Be; colorimetric determination of Be. 86 ref. (S11, 10-54; Be)

112-S. (Russian.) **Spectroscopic Analysis of High-Purity Zinc by Vacuum Sublimation.** D. M. Shvarts and L. N. Kaporskii. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1309-1313.

15 ref. (S11k; Zn)

113-S. (Russian.) **Spectral Analysis of Titanium.** L. M. Filimonov, A. I. Essen and Z. A. Zakharova. *Zavod-*

skaya Laboratoriya, v. 23, 1957, p. 1313-1315.

13 ref. (S11k; Ti)

114-S. (Russian.) **Spectroscopic Analysis of Titanium-Base Alloys.** K. A. Moiseeva, K. A. Sukhenko, S. I. Mladentseva and A. V. Aksenova. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1316.

(S11k; Ti)

115-S. (Russian.) **Spectroscopic Analysis of Beryllium.** P. M. Polyakov, A. K. Rusanov and I. M. Blokh. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1320-1323.

4 ref. (S11k; Be)

116-S. (Russian.) **Spectrochemical Determination of Small Quantities of Uranium in Native State.** T. M. Moroshkina, V. K. Prokofev and M. N. Smirnova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1324-1327.

4 ref. (S11k; U, RM-n)

117-S. (Russian.) **Spectroscopic Semi-Quantitative Determination of Boron in Ores and Minerals.** B. M. Maslennikov and L. V. Romanova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1327-1328.

(S11k; *B,* RM-n)

118-S. (Russian.) **Experiments With Spectroscopic Apparatus "Fian" to Determine Phosphorus Content of Steels.** L. M. Ivantsov, I. I. Konstantinov, V. V. Sukhovalova and A. I. Shurygin. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1329-1332.

(S11k; ST, *P*)

119-S. (Russian.) **Spectrochemical Determination of Small Quantities of Columbium in Ores.** V. V. Nedder. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1336-1337.

4 ref. (S11k; Cb, RM-n)

120-S. (Russian.) **Spectroscopic Determination of Iron, Manganese, Magnesium, Silicon and Lead in Cupronickel MN-19.** G. M. Volkogon, G. D. Smirnovoi and V. I. Rogov. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1337-1338.

(S11k; Cu, Ni; *Fe, Mn, Mg, Si, Pb*)

121-S. (Russian.) **Use of Rated Graphs in Spectroscopic Analysis of High Speed Steels and Bronze AZH-9-4.** R. I. Kusheva and A. V. Kungrurova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1357-1360.

(S11k; TS-m, Cu-s)

122-S. Investigation and Controls of Openhearth Production Problems. A. V. Lang and T. A. Cleary, Jr. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1407-1412.

Application of statistical methods to investigation and control of basic openhearth production. Correlation analysis, long-term and short-term trends. 5 ref. (S12, D2)

123-S. Magnetic Particle Inspection of Gray Iron Castings. Arthur Lindgren. *Foundry,* v. 86, Feb. 1958, p. 178-184.

(S13j; CI-n)

124-S.* Thickness of Lead Deposits. Measurement by Means of Beta Rays. Gunner Gabrielson and Kurt Ljunggren. *Metal Finishing,* v. 56, Feb. 1958, p. 52-53.

Method of measuring thicknesses of metallic coatings by means of back-scattering of beta rays is more accurate the larger the difference between the atomic numbers of the coating and the basis metal. Since lead has a very high atomic number, the method is suitable for determining the thickness of a lead deposit on most common metals (e.g., Fe and Cu). (S14e; Fe, Cu, *Pb*)

125-S. Automatic Gauge Control of Cold Rolling. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 29-30, 32.

Radio-isotope method controls strip thickness at D. F. Taylor and Co., Ltd., Birmingham, England. (S14e, 1-59, F23; ST, 4-53)

126-S. Brightness of Fluorescent Penetrants, Its Measurement and Influence in Detecting Defects. D. W. Parker and J. T. Schmidt. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 330-332, 354.

(S13k)

127-S. Ultrasonic Testing of Material for Nuclear Components. Frank W. Armstrong. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 342-344, 350.

(S13g, T11)

128-S. A Way to Speed Analysis. *Steel,* v. 141, Dec. 9, 1957, p. 156.

Steel foundry uses X-ray spectrometer to analyze heats in 1/10 the time formerly required. (S11p, E10; ST)

129-S. (French.) **Cause of Error in Wet Determination of Nitrogen in Special Steels.** René Castro, Jacques Allemand and René Poussardin. *Analytica Chimica Acta,* v. 17, Dec. 1957, p. 530-534.

Determination of N in normal or special steels by Kjeldahl method can give results that are too high if acid used contains impurities such

as nitrates and if metal contains even a few ten-thousandths of molybdenum. 4 ref. (S11; ST, *N*)

130-S. (Russian.) **Ultrasonic Flaw Detection in Cast Iron.** N. V. Khimchenko. *Liteinoe Proizvodstvo,* Aug. 1957, p. 15-18.

Method was found to be sensitive to the presence of free graphite particles in cast iron. 3 ref. (S14g; CI)

131-S. Spectrophotometric Determination of Iron With Ethylenediamine Di (o-Hydroxyphenylacetic Acid). A. L. Underwood. *Analytical Chemistry,* v. 30, Jan. 1958, p. 44-47.

(S11k; Fe)

132-S. Analysis of High-Purity Iron. R. E. Heffelfinger, D. L. Chase, G. W. P. Rengstorff and W. M. Henry. *Analytical Chemistry,* v. 30, Jan. 1958, p. 112-114.

Use of special concentrating techniques, such as ether separation and sulphide precipitation in conjunction with spectrographic analysis. 13 ref. (S11k, S11f; Fe-a)

133-S. Analysis of Zirconium/Cerium Binary Alloys. G. W. C. Milner and G. W. Sneddon. *United Kingdom Atomic Energy Authority,* A.E.R.E. C/R 1654, Sept. 16, 1957, 1 p.

6 ref. (S11j; Ce, Zr)

134-S. (German.) **Investigations of Hard Metals.** Christa Streil. *Chemische Technik,* v. 9, Nov. 1957, p. 672-675.

Determination of specific gravity, carbon and graphite content and metallic components. (S11, S14j, P10a, SGA-q)

135-S. (German.) **Thickness Measuring of Electroplate.** G. Oelsner. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Oct. 1957, p. 417-430.

Methods and instruments, construction and operation. 14 ref. (S14, 1-53; 8-62)

136-S. (German.) **Determination of Hydrogen in Liquid and Solid Pig Iron.** K. Zimmermann and H. Uhlitzsch. *Neue Hütte,* v. 2, Oct. 1957, p. 607-616.

Pt. I: Iron-hydrogen system; sampling, analysis, apparatus. Pt. II: Hydrogen content and behavior. 80 ref. (S11, N1, 1-54, S12; CI-a, *H*)

137-S. (German.) **Determination of Structural Constituents of Steels.** W. Koch and H. Sundermann. *Radex Rundschau,* no. 5-6, 1957, p. 679-692.

Electrolytic dissolution for determination of ferrous components; new magnetic technique for separating residues. 10 ref. (S11g; M23a, ST)

138-S. (German.) **New Electrolytic Method for Carbide Investigation in Carbon Steels.** T. Heczko. *Radex Rundschau,* no. 5-6, 1957, p. 711-724.

9 ref. (S11g; CN, *C*)

139-S. (German.) **Separation of Sulphides.** E. Artner. *Radex Rundschau,* no. 5-6, 1957, p. 725-726.

Magnetic separation method developed by W. Koch and H. Sundermann. (S11f; ST, *S*)

140-S. (German.) **Determination of Oxide Inclusions in Killed and Partly Killed, Carbon and Low-Alloy Steels.** E. Piper, H. Hagedorn, H. Kern and J. Ingeln. *Radex Rundschau,* no. 5-6, 1957, p. 727-737.

6 ref. (S11; ST, *O,* 9-69)

141-S. (German.) **Seam Weld Testing With Ultrasonics.** René Hornung. *Schweisstechnik,* v. 11, Sept. 1957, p. 103-106.

History, principles, equipment and operation for direct and resonance testing. Advantages over X-ray techniques are quick location and measurement of cracks and other defects in the whole length and depth as well as in the use of simple and economical equipment. (S13g, 1-53, 7-51)

142-S. (German.) **Determination of Small Amounts of Molybdenum in Tungstates.** Christoph Winterstein. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Nov. 1957, p. 549-551.

A new photometric method using sodium fluoride to keep tungstic acid in solution. (S11j; Mo)

143-S. (German.) **Ultrasonic Field and Its Importance for Testing Forgings by an Immersion Technique.** Josef Krautkrämer. *Zeitschrift für Metallkunde,* v. 48, Nov. 1957, p. 606-609.

(S13g, 1-74; 4-51)

144-S. (Slovenian.) **Application of Mathematical Statistics in Study of Uniform Constitution of Refined Steel.** Otmar Gautsch. *Nova Proizvodnja,* v. 8, Nov. 1957, p. 312-313.

(S12, 2-60; ST)

145-S. Should Ultrasonic Inspection Be Used to Augment Radiography in the Inspection of Weldments in High-Pressure Piping. R. L. Steele. *American Society of Mechanical Engineers,* Paper no. 57-A—195, Dec. 1957, 9 p.

(S13g, S13e; 7-51)

146-S. Ultrasonic Testing of Large Rotor Forgings. Criteria for Detecting Ability. S. Serabian and G. E. Lockyer. *American Society of Mechanical Engineers,* Paper no. 57-A—279, Dec. 1957, p. 2-10.

Factors influencing selection of suitable ultrasonic techniques; testing techniques for initial forging inspection and the finished rotor assembly. (S13g; 4-51)

147-S. Determination of Thorium in Ores With APANS-Meso Tartaric Acid Reagent After a Shortened Chromatographic Separation. D. A. Everest and J. V. Martin. *Analyst,* v. 82, Dec. 1957, p. 807-811.

14 ref. (S11a; Th, RM-n)

148-S. Molybdate Method for Determination of Phosphorus, Particularly in Basic Slag and in Steel. D. Stockdale. *Analyst,* v. 83, Jan. 1958, p. 24-36.

4 ref. (S11j; ST, RM-q, *P*)

149-S.* Methods for Rapid Determination of Silicon in Ferrosilicon. Sigurd Velken. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 119-121.

Two volumetric methods based on precipitation of Si as potassium fluosilicate followed by titration of this compound. The methods have a reproducibility equal to the conventional gravimetric methods and are far more rapid. 11 ref. (S11j; *Si,* AD-n)

150-S.* Effect of Nitrides in Silicon Iron on the Determination of Oxygen by Chlorination, and the Possible Direct Determination of Aluminium Nitride. F. J. Armson and H. L. Bennett. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 132-137.

Silicon iron containing 4% Si and 0.3% Al has been analyzed for oxygen by chlorination in a vertical closed reaction chamber. The oxides are present almost entirely as alumina and silica, but a substantial proportion of the nitrogen is retained in the residue as aluminum nitride. Unless a correction is applied, a large error results in the oxygen content. The magnitude of the correction can be diminished by chlorinating at 600 instead of 500° C. 19 ref. (S11; Fe, *O*)

151-S.* Routine Determination of Oxygen in Steel Using a Carrier-Gas Fusion Technique. C. E. A. Shanahan and F. Cooke. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 138-142.

The sample is melted in a carbon crucible and the carbon monoxide evolved is extracted by a streaming carrier gas and not by vacuum pumps, as in the well known vacuum-fusion procedure. A determination may be made within 15 min. with a standard deviation of about 0.0016%. (S11r; ST, *O*)

152-S. Translator Control. W. N. Jenkins. *Iron and Steel Institute, Journal,* v. 188, Feb. 1958, p. 157-168.

Methods of controlling variables in the steel mill.
(S18, D-general, F23; ST)

153-S.* Rapid Titrimetric Analysis of White Metals. L. J. Ottendorfer. *Metallurgia,* v. 57, Feb. 1958, p. 105-106.

Highly accurate results are obtained in less than 1 hr. in the analysis of alloys of Sb, Sn, Pb and Cu, by a combination of bromatometric methods (for Sb and Sn) with complexometric methods (for Pb and Cu). (S11j, Pb, *Sb, Cu, Sn*)

154-S. X-Ray Emission Spectrographic Analysis of Bastnaesite Rare Earths. Farrel W. Lytle, James I. Botsford and Henry A. Heller. *U. S. Bureau of Mines, Report of Investigations* 5378, May 1957, 15 p.

23 ref. (S11p; EG-g)

155-S. (English.) Flame Spectrophotometric Method for Determination of Nickel and Boron in Plating Solutions. D. E. Fornwalt. *Analytica Chimica Acta,* v. 17, Dec. 1957, p. 597-603.

(S11k, L17a; *B, Ni*)

156-S. (French.) Determination of Nitrogen in Carbon or Special Steels. Rene Castro, Jacques Allemand and Rene Poussardin. *Analytica Chimica Acta,* v. 17, Dec. 1957, p. 530-534.

4 ref. (S11j; ST, *N*)

157-S. (Japanese.) Spectrochemical Analysis With the Universal Source Unit. Pt. 5. Determination of Lead in High-Purity Zinc. Kasuo Yasuda. *Japan Analyst,* v. 6, Dec. 1957, p. 768-744.

4 ref. (S11k; *Pb,* Zn-a)

158-S. (Japanese.) Electrochromatography. Pt. 19. Separation and Quantitative Estimation of Rare Earths in Monazite Sand by Electrochromatography. Masafumi Maki. *Japan Analyst,* v. 6, Dec. 1957, p. 779-782.

8 ref. (S11a; EG-g)

159-S.* Use of Ultrasonic Testing for the Control of Quality in the Manufacture of Aluminium Alloys and

Other Non-Ferrous Materials. J. G. Harris and J. Crowther. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 193-206.

Ultrasonic testing in final inspection and at earlier stages in processing has led to a marked improvement in the quality of high-strength Al alloy plate, extrusions and forgings. Characteristic defects of cast and wrought material in relation to their location and evaluation by available methods; precise evaluation of defect signals is generally not to be expected. Techniques should be carefully chosen to suit the nature and geometry of the product and the standard of inspection required. 29 ref. (S13g; Al)

160-S.* Recent Advances in Radiographic Techniques. R. Halmshaw. *Institute of Metals, Journal,* v. 86, Jan. 1958, p. 207-211.

Technique and extensions of the scope of radiography, particularly higher-power X-ray sources and of radioisotopes. Methods being developed to reduce the cost and increase the speed of radiography include fluoroscopy, electronic image-intensifiers, miniature-film recording techniques, use of X-ray paper, Xeroradiography, ionography and scanning with counters. 20 ref. (S13e, X8)

161-S. Assessment of Surface Finish. *Iron and Steel,* v. 31, Feb. 1958, p. 63-64.

Determination of surface finishes to about 1 micro-in. can be made much more rapidly with new interference microscope than with conventional methods. (S15d, X3q)

162-S. Measurement of Paint Thickness on Aircraft. N. R. Keegan. *Machinery* (London), v. 92, Jan. 17, 1958, p. 156.

Paint layer on high-speed aircraft, in addition to being smooth, must be of uniform thickness to close limits. Advantages of recently modified Boonton gage which measures paint thicknesses accurately and conveniently. (S14h, T24a, X20c, NM-g)

163-S. Fundamentals of Differential Radiation Measurements. Richard F. Nickerson. *Nondestructive Testing,* v. 16, Jan-Feb. 1958, p. 24-27, 41.

Mathematical treatment of absorption processes; factors which affect ability of user to discriminate between small differences. (S13e)

164-S. Frequency Selection for Eddy Current Testing. B. H. Robinson. *Nondestructive Testing,* v. 16, Jan-Feb. 1958, p. 36-39.

For testing nonmagnetic rods, tubes and wires for longitudinal cracks, by means of annular coils, the best criterion is signal-to-noise ratio; other factors in selection are sample diameter, sample conductivity, character and location of defect, speed of inspection and instrumentation employed. (S13h)

165-S. Modern High Speed Radiographic Technics Speed and Simplify Douglas Inspection. E. W. Makin. *Nondestructive Testing,* v. 16, Jan-Feb. 1958, p. 42-43.

New X-ray techniques used for inspection of control surfaces and inaccessible structural segments of air frames, for debris, cracks and structural failures. (S13e, T24a)

166-S. (German.) **Interference Microscope Investigation on Bright Metal Surfaces.** E. Raub. *Werkstattstechnik und Maschinenbau,* v. 48, Jan. 1958, p. 37-40.

Various methods of polishing, testing results by means of interference microscopy. (S15d, 1-53, X3q)

167-S. (Italian.) **Determination of Lead, Thallium and Bismuth by Distribution in Counter-Current.** Antonio Catino and Maddalena Maletto. *Rassegna Chimica,* v. 6, Sept-Oct. 1957, p. 3-10.

New microchemical method for rapid analysis of alloys containing these elements; experimental determination and theoretical calculation of curves of distribution in countercurrent; effect of pH and concentration of coefficients of distribution. By varying the concentration of hydrogen ions it was possible to determine coefficients of distribution of the dithizone-treated metals studied and to establish the optimum separation that occurs around pH 4.54. 10 ref. (S11d; Bi, Pb, Th)

168-S. (French.) **Rapid Determination of Lead in the Sulphate State in Antifriction Alloys.** E. Garate and T. Garate. *Chimie Analytique,* v. 40, Jan. 1958, p. 7-10.

Simple, accurate method requiring no previous separation of other components; can be used equally well on Sb-Pb alloys, tin solders and bronzes; uses diluted nitric and hydrofluoric acids. 10 ref. (S11j, S11k; Pb)

169-S. (French.) **New Method for Analyzing Copper Alloys.** M. Kuhn.

Chimie Analytique, v. 49, Jan. 1958, p. 11-19.

Method based on complete dissolution of bronzes in nitrofluoboric medium has been tested on tin bronzes, has wide application. (To be continued.) (S11j; Cu-s)

170-S. (German.) **Bearing Material Testing. Pt. 1.** R. Weber. *Metall*, v. 12, Feb. 1958, p. 96-103.

Physical, mechanical ("volumen") and surface properties. Testing machines and methods; evaluation of materials on the basis of their volume. (S14, Q-general; SGA-c)

171-S (German.) **Turbidimetric Determination of the Tin Content in High-Purity Zinc and Zinc Alloys.** H. Pohl. *Metall*, v. 12, Feb. 1958, p. 103-105.

(S11j; Zn, *Sn*)

172-S. (Japanese.) **Photometric Determination of Small Amounts of Nickel in Ores.** Hiyoshi Isono. *Japan Analyst*, v. 6, Sept. 1957, p. 557-561.

Improvements on the E. B. Sandell method of colorimetric determination of Ni in chloroform.
(S11a; Ni, RM-n)

173-S. (Japanese.) **Rapid Determination of Ferrophosphorus.** Shigeo Wakamatsu. *Japan Analyst*, v. 6, Sept. 1957, p. 579-582.

(S11j; P)

174-S.* **Control Analysis of Aluminum Alloys and Copper Alloys Using Self-Recording Spectrometers.** M. Milbourn and J. A. F. Gidley. *Institute of Metals, Journal*, v. 86, Jan. 1958, p. 219-224.

Quantometer for complete analysis of Al alloys, Hilger Polychromator for determining several constituents in a range of Cu alloys, and a Hilger medium spectrograph with direct-reading attachment, used on Cu alloys. Rapid, accurate analytical results on Al alloys give full compositional control of the casting process, with consequent economies in conversion costs, use of raw materials and stock handling, and with a more uniform finished product and reduced analytical effort. 4 ref. (S11k; Al, Cu)

175-S.* **Instrumentation in Ultrasonic Flaw Detection.** D. G. W. Claydon. *Institute of Metals, Journal*, v. 86, Feb. 1958, p. 241-251.

Methods of generating ultrasonic pulses and their behavior at an interface; the oil-film, immersion, and irrigation methods of coupling; design and use of probes. (S13g, 1-53)

176-S. (Dutch.) **Supersonic Examination of Material.** F. Walters. *Lastechniek*, v. 24, Feb. 1958, p. 20-22.

Material of homogeneous composition being a good sound conductor, electric oscillations transformed first into mechanical oscillations and then back into electric oscillations, travel in a straight line through the material and indicate the presence of faults, although not their exact location. Result of the examination is immediately visible or audible or both. (S13g)

177-S. (French.) **Surface Roughness Standards.** l'Abbe Cayere. *Machine Moderne*, v. 52, Feb. 1958, p. 9-15.

Surface roughness analyzed by pneumatic profilograph and compared to sets of surface roughness standards. (S15b)

178-S. (French.) **Determination of Thickness and Composition of Oxide Films on Tin and Tin Plate.** S. C. Britton and K. Bright. *Métaux Corrosion Industries*, v. 32, Nov. 1957, p. 435-442.

(S14c, S11g; Sn)

179-S.* (German.) **Thermo-Electric Measurement of Openhearth Furnace Roof Temperatures.** H. J. Kirschning, E. Hochstrate and H. Rodrian. *Archiv für das Eisenhüttenwesen*, v. 28, Oct. 1957, p. 611-614. (Translation in *Iron and Coal Trades Review*, v. 176, Jan. 1958, p. 42-44.)

The main cause of difficulties in measurement of furnace temperatures lies in the diffusion of carbon into the protective ceramic sleeves around the Pt-Rh thermocouples and subsequent changes in structure and temperature resistance. Al_2O_3, MgO, $Al_2O_3 \cdot BeO$ and ZrO_2 are compared as sleeve material; melting point, thermoconductivity, sensitivity to temperature fluctuations and corrosion resistance are given. BeO proved best for permanent and economic sleeve material. 8 ref. (S16b, W18r, X9q; Pt, Rh, RM-h)

180-S. (German.) **Use of Piacryl "SH" for Surface Examination.** S. Sohrmann. *Fertigungstechnik*, v. 8, Jan. 1958, p. 25-28.

Application possibility of a synthetic material, Piacryl "SH" pink, designed originally for dentistry. Method of application and results of experiments. 9 ref. (S15d)

181-S. (German.) **Separation of Rare Earths. Pt. 5. With Cation Exchangers.** Leopold Wolf and Joachim Massonne. *Journal für Praktische,* v. 5, Oct. 1957, p. 21-33.

9 ref. (S11f; EG-g)

182-S. (German.) **Methodology of Analysis of Graphite-Containing Cast Iron.** W. D. Gras and A. Wittmoser. *Radex Rundschau,* no. 5-6, 1957, p. 771-775.

A method of analysis of carbides in cast iron; quantitative determination of isolates and separation of most important constituents of microstructure following electrolysis. 6 ref. (S11f; ST, 14-68)

183-S. (German.) **Exposure and Determination of Oxide Inclusions in Chromium-Rich Steels and Attempts to Isolate Oxides in 18-8-Steels.** E. Piper, H. Hagdorn, H. Kern and J. Ingelin. *Radex Rundschau,* no. 5-6, 1957, p. 776-783.

6 ref. (S11f; AY, *Cr,* 9-69, 14-68)

184-S. (German.) **Statistical Investigation of Procedures for Determination of Oxide Inclusions in Steels.** E. Piper and H. Kern. *Radex Rundschau,* no. 5-6, 1957, p. 840-842.

10 ref. (S12; ST-d, *O,* 9-69)

185-S. (German.) **Photometric Determination of Antimony in Pure and Electrolytic Copper.** Charles M. Dozinel. *Zeitschrift für Analytische Chemie,* v. 157, no. 6, 1957, p. 401-405.

8 ref. (S11a; Sb, Cu)

186-S. (German.) **Application of Mathematical Statistics in Metallurgy.** Rolf Wartmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Feb. 1958, p. 63-69.

(S12)

187-S. (German.) **Impulse Echo Testing of Plate-Shaped Materials.** Werner Grabendörfer and Josef Krautkrämer. *Zeitschrift für Metallkunde,* v. 49, Jan. 1958, p. 22-26.

(S13g; 4-53)

188-S. (Japanese.) **A Simple Method of Microdetermination of Carbon in Iron Steel and Ferro-Alloys.** Hidehiro Goto, Toshio Watanabe and Kyohei Suzuki. *Japan Analyst,* v. 6, Oct. 1957, p. 650-654.

Determination of carbon dioxide in vacuum apparatus. (S11d; ST, *C*)

189-S.* (Spanish.) **Determination of Magnesium in Nodular Castings.** Julian Bernal Nievas and Luis Serrano Berges. *Instituto del Hierro y del Acero,* v. 10, Oct-Dec. 1957, p. 389-395.

Proposed volumetric, indirect and direct colorimetric methods and results of experiments under deliberately varied conditions. Reagent used in all methods is methyl 2-8 quinolinol and prior elimination of iron is achieved by means of electrolysis with a mercury cathode. 16 ref. (S11j, S11a; CI-r, *Mg*)

190-S. Vacuum Fusion Apparatus for Gas Analysis. P. D. Blake. *Iron and Steel Institute, Journal,* v. 188, Mar. 1958, p. 261-264.

For determining total and fractional oxygen content of steels. (S11e, X21; ST, *O*)

191-S. Absorptiometric Determination of Traces of Chromium in Nickel and Vanadium, of Vanadium in Chromium, and of Nickel in Chromium and Vanadium. J. T. McAloren and G. F. Reynolds. *Metallurgia,* v. 57, Jan. 1958, p. 52-56.

(S11a; Cr, Ni, V)

192-S. New Reagent for the Colorimetric Determination of Aluminum. H. Green. *Metallurgia,* v. 57, Mar. 1958, p. 157-158.

(S11a; Al)

193-S. Development of Ultrasonic Techniques for Inspecting Experimental Boiling Water Reactor Cast Uranium Alloy Cores and Fuel Plates. W. N. Beck and W. J. McGonnagle. Argonne National Laboratory. *U. S. Atomic Energy Commission,* ANL-5653, Dec. 1957, 31 p.

9 ref. (S13g, T11g; U-b)

194-S.* (Czech.) **Ultrasonic Testing of Turbogenerator Rotors.** Karel Slonek. *Hutnické Listy,* v. 13, Jan. 1958, p. 33-37.

Manual ultrasonic control for determination of important defects in rotors. Of 53 rotors tested, the ultrasonic finding was verified with eight rotors by means of cross-sections. Results show the ultrasonic method to be suitable for homogeneity control of turbine material and generator rotors. 8 ref. (S13g, T7h)

195-S.* (French.) **Contribution to the Improvement of Gamma-Ray Techniques.** P. Ruault and P. Rath. *Revue de Metallurgie,* v. 55, Jan. 1958, p. 39-52.

Gamma-ray inspection can be improved by reduction of exposure time, use of overdevelopment, better use of emulsions, reinforcement with lead screens, quality control of radiographic image. (S13e)

196-S.* (German.) **Control Techniques and Their Application in a Continuous Wiredrawing Mill.** H. Cordes. *Draht,* v. 9, Feb. 1958, p. 39-43.

Types of control; examples of application, control as a means of automatizing production. (S18, F28, 1-61)

197-S. (German.) **Bright Steel Surface.** Otto Andrien. *Industrie-Anzeiger,* v. 79, Oct. 11, 1957, p. 1235-1237.

Determination of flaws in bright steel surfaces. (S15; ST)

198-S. (German.) **Reduction of Testing Costs.** Hans Schmidt. *Werkstatt und Betrieb,* v. 91, Feb. 1958, p. 61-65.

Description and use of multiple sample testing outfits. 5 ref. (S12h, X-general)

199-S.* **X-Rays Speed Inspection of Raw Stock.** Vern W. Palen. *American Machinist,* v. 102, Feb. 24, 1958, p. 100-101.

Analysis of raw steel bar stock done more accurately and five times faster by X-ray diffraction than by chemical analysis. Specimens are cut (½ in. long), flattened and polished, and placed in X-ray spectrograph. It operates and stops automatically, measuring the time a fixed number of pulses have been reflected. (S11p; ST, 4-55)

200-S. (English.) **Segregation in Castings by Spectrographic Analysis. Pt. 4. Segregation in Copper Alloy Castings; Segregation in Aluminum Alloy Castings.** Kazuo Yasuda. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 47-53.

Local spectrographic analysis used for determining segregation in Cu-Sn or Cu-Zr alloys cast in water-cooled metal or green sand molds. Method also used on Al-Cu, Al-Mg and Al-Si alloys cooled at various speeds. (S13d, S11c; Al-b, Cu-b, 5-60, 9-69)

201-S. (English.) **Mass Spectrometric Determination of Gases in Cast Iron. Apparatus and Determination of Nitrogen.** Eiichi Kato. *Waseda University, Castings Research Laboratory, Report,* no. 8, Nov. 1957, p. 81-84.

Vacuum fusion apparatus and procedure utilizing mass spectrometer for determining gases in cast iron. Determination of nitrogen content and comparison with that obtained by chemical methods. (S11c; CI, *O, N*)

202-S. (French.) **New Apparatus for Nondestructive Continuous Metal Control.** L. Beaujard and V. Husarek. *Metaux-Corrosion-Industries,* v. 32, Dec. 1957, p. 459-468.

Electromagnetic and ultrasonic methods and applications in the iron and steel industry. (S13h, S13g, 1-52)

203-S. (Book—French.) **Nondestructive Methods for the Study and Control of Materials.** J. L. Pignet. 280 p. 1957. Revue Optique, 3 et 5, Blvd. Pasteur, Paris 15, France.

Internal and surface examination and testing techniques, their applications, geometric and physical laws utilized, equipment employed, interpretation of results. Classic and conventional methods plus newer techniques involving use of gamma and X-rays, ultrasonics, liquid penetration, magnetic particle inspection, etc. Examples of industrial applications. (S13, S14, S15)

204-S.* **Steel Heat Treatment Quality Control. Pt. 1. The Quality Control Plan.** Konrad Kornfeld. *Canadian Metalworking,* v. 21, Mar. 1958, p. 24, 26, 28.

Consideration of material quality, furnace temperatures, quenching and supervision of personnel to maintain standards of a steel product. (S-general; J-general; ST)

205-S.* **Quality Control in Cupola Melting.** R. A. Short. *Canadian Metalworking,* v. 21, Mar. 1958, p. 30, 32, 34, 36, 38.

Statistical quality control records for each day establishes a trend which can be used to determine control limits in iron smelting. (S12, E10a)

206-S.* **Automatic Gauge Control in Rolling Mills.** R. B. Sims. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 289-302.

Theoretical background of automatic gage control. Installations of the Davy-United B.I.S.R.A. system on reversing and tandem mills, and some other types of control operated from thickness gages, and maintaining strip thickness by varying either the position of the mill screws or the applied strip tension. Economics of the controller. 15 ref. (S14, X20c, W23p, 1-52)

207-S.* **Accuracy of Strip-Thickness Measurement by Beta and**

Gamma Absorption. E. B. Bell. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 303-309.

Fundamental and operational accuracy limitations, with particular reference to statistical variations, detector sensitivity variations, electronic drift, movement of absorber and variation of these errors over the range of the instruments. 4 ref. (S14e, 4-53)

208-S.* Measurement, Inspection, and Automatic Process Control in the Steel-Strip Finishing and Tinplate Industry. S. S. Carlisle and J. H. Wilson. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 310-315.

Nondestructive inspection techniques developed for continuous steel strip processing lines: measurement of coating thickness by X-ray fluorescence, measurement of strip width and thickness and detection of pinholes and lamination. Need for a suitable method for continuous and objective measurement of tinplate surface quality. 11 ref. (S13, S14; ST, *Sn,* 4-53)

209-S. Inspection of Tubes for Flaws and Variations in Thickness. J. B. C. Robinson. *Institute of Metals, Journal,* v. 86, Mar. 1958, p. 316-322.

Fundamental aspects of eddy-current inspection with special reference to a commercial instrument—the "Introview"—and the probe design. Metallurgical and physical conditions of tubing as they affect eddy-current techniques. Use of eddy currents for inspecting condenser tubes after a period of service and for detecting flaws in tubes during production. 11 ref. (S13h, S14h; 9-71, 4-60)

210-S. Basic Guides to Steel Quality. *Steel,* v. 142, Apr. 28, 1958, p. 106, 109.

Use of control charts, frequency distribution and sampling to assure valve steel quality. (S12; ST)

211-S. Spectrographic Determination of Uranium in Ores and the Products Obtained by Treatment of These Ores. N. G. Morozova. *Journal of Analytical Chemistry of the USSR,* v. 12, no. 2, 1957, p. 183-190. (Translation by Consultants Bureau, Inc.)

6 ref. (S11k; *U,* RM-n)

212-S. Apparatus for Determining the Content of Gases in Metals. Z. M. Turovtseva, N. F. Litvinova, G. V. Mikhailova, A. S. Noskov and R. Sh. Khalitov. *Journal of Analytical Chemistry of the USSR,* v. 12, no. 2, 1957, p. 207-211. (Translation by Consultants Bureau, Inc.)

Gases are analyzed by passing the hydrogen evolved through a palladium filter, CO is oxidized to CO_2 and the latter condensed with liquid nitrogen, while nitrogen is determined on the basis of residual pressure. An attachment to the apparatus insures loading of the crucible without destroying the vacuum. 6 ref. (S11r, 1-53)

213-S. Potentiometric Method of Determining Small Amounts of Barium in Nickel-Based Alloys by Means of Complexone III. L. Ya. Polyak. *Journal of Analytical Chemistry of the USSR,* v. 12, no. 2, 1957, p. 223-227. (Translation by Consultants Bureau, Inc.)

12 ref. (S11j, Ni, *Ba*)

214-S. (German.) Determination of Small Amounts of Titanium in Iron Alloys and Ores. Ernst Schoffmann and Hanns Malissa. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 623-624.

9 ref. (S11a; *Ti,* Fe-b, RM-n)

215-S. (German.) Quantitative Determination of Alloy Components in Steel by Means of X-Ray Fluorescent Spectral Analysis. Hans Krächter and Willi Jäger. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 633-639.

(S11p; ST)

216-S.* (German.) Spectrographic Determination of Trace Elements in Steel by Means of Agitated Electrodes. Siegfried Eckhard and Walter Koch. *Archiv für das Eisenhüttenwesen,* v. 28, Nov. 1957, p. 731-738.

The sensitivity of spectrographic methods for trace elements has so far been limited through interference with other stronger spectral lines. Chemical procedure to eliminate interference requires considerable effort and time. The direct agitation of electrodes to speed volatilization of the elements increases the sensitivity and decreases the uneven distribution of trace elements in the specimen. (S11k; ST)

217-S.* (German.) Nondestructive Testing of Metals by Means of Electromagnetic Induction Methods. F. Forster. *Metall,* v. 11, Oct. 1957, p. 837-845.

A systematic survey of all the known eddy current testing methods and devices and their experimental evaluation. Principles of detecting defective materials (cracks, flaws, variations in composition), or of

testing physical dimensions (such as electric conductivity, wall thickness, thickness of isolation layers of metal coatings). 54 ref. (S13h, S14h)

218-S. (German.) **Rapid Photometric Analysis of Titanium in Copper Alloys.** H. Wiedmann. *Metall,* v. 11, Nov. 1957, p. 942-943.

(S11a; Cu-b, *Ti*)

219-S. (German.) **Comparative Potentiometric Determination of Manganese in Copper and Its Alloys.** H. Pohl. *Metall,* v. 11, Nov. 1957, p. 947-949.

4 ref. (S11j; Cu-b, *Mn*)

220-S. (German.) **Possibilities and Limits of X-Ray Mineral Analysis of Bauxites.** Hans Ginsberg and Karl Wefers. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Oct. 1957, p. 499-503.

In addition to chemical analysis it is desirable to develop other reliable methods for determination of mineral forms in bauxite. As long as there is only one component present the X-ray method is sufficiently accurate. Mixtures of components do not permit quantitative X-ray detremination of the minerals, because of their different and complex crystalline orientations. (S11p; Al, RM-n)

221-S. (Russian.) **Determination of Zirconium by Amperometric Titration With Cupferron.** Yu. I. Usatenko and G. E. Bekleshova. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1406-1407.

4 ref. (S11j; Zr)

222-S. (Russian.) **Colorimetric Determination of Zirconium With Phenylfluorone.** F. G. Zharovskii and A. T. Pilipenko. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1407-1410.

6 ref. (S11a; Zr)

223-S. (Russian.) **Analysis of Gases in Steel by Means of Heating in Vacuum.** Yu. A. Klyachko, L. L. Kunin, E. M. Chistyakova and N. S. Larichev. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1410-1412.

4 ref. (S11r; 1-73; ST)

224-S. (Russian.) **Determination of Gases in Ferrous Metals.** Z. M. Turovtsva. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1432-1436.

A review. 29 ref. (S11r; Fe)

225-S. (Russian.) **Mass-Spectrometric Investigation of Kinetics of Separation of Gases From Metals.** V. I. Fistul. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1448-1451.

6 ref. (S11c, S11r)

226-S. **On the Estimation of Beryllium. Pt. 2. A New Rapid Gravimetric Method for Its Estimation in Beryl.** Apurba Kumar Sen Gupta. *Indian Chemical Society, Journal,* v. 34, Oct. 1957, p. 725-727.

Based on a new extraction process using sodium tetrafluoborate as flux. Compares advantages of this method to others in use. (S11b; Be)

227-S.* **Determination of Arsenic in Iron and Steel.** *Iron and Steel Institute, Journal,* v. 188, Apr. 1958, p. 331-337.

Colorimetric method for the routine determination of As up to 0.03%, development of a standard method for the determination of all As contents in iron and steel. The latter is based on reduction and precipitation of As with hypophosphite and titration with iodine. (S11a, S11j; ST, *As*)

228-S.* **Betatron Speeds Non-Destructive Testing.** V. Wolpert. *Metalworking Production,* v. 102, Feb. 14, 1958, p. 280-282.

Revolving Brown Boveri betatron with two beams of 31 Mev. for testing complex parts of great thickness in very short time sometimes preceded with ultrasonic echo testing on large parts for indication of defects. Relative merits of X-ray, cobalt-60 isotope and Betatron techniques. (S13e, 1-53)

229-S. **Some Notes on an Attempt to Use T.T.A. in Conjunction With Chromatography for the Separation of Rare Earths.** F. W. Cornish. *United Kingdom Atomic Energy Authority, Atomic Energy Research Establishment* T/M 145, June 1957, 11 p.

5 ref. (S11f; EG-g)

230-S. **Mechanization of Openhearths Using Electronic Apparatus.** P. G. Baranovskii and Ya. S. Pinus. *Metallurg,* Feb. 1958, p. 15-17. (Iron and Steel Institute Translation no. 927.)

Use of electronic devices to develop more effective interconnection between various control mechanisms and more precise control of temperature. (S18, S16, W18r, 18-74)

231-S. (French.) **Micro-Analyzer for Determination of Very Small Gas Samples.** A. Blondel. *Fonderie,* v. 144, Jan. 1958, p. 19-24.

10 ref. (S11r)

232-S. (French.) **Spectral Analysis of Metals.** *Machine Moderne,* v. 12, Mar. 1958, p. 57-63.

Study of spectral radiations, spectral analysis, apparatus standardizing, spectroscopes and spectrographs. (To be continued.) (S11k)

233-S. (German.) **Use of Infrared Spectroscopy in Determining Mineral Components of Slag and Heat Resistant Systems.** Werner Pepperhof. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 153-158.

Infrared absorption spectra measured between 6 and 14 μ. Small specimens (about 1 mg.) were prepared by potassium bromide press technique (pressure up to 600 kg. per sq. cm.) Spectra of various substances and even of the polymorphous phases have characteristic features. Method can supplement usual chemical and crystallographic determination of mineral components. (S11a, RM-q)

234-S.* (German.) **Main Accompanying Elements in Pig Iron and Their Chemical Determination.** Theo Kurt Willmer. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 159-164.

Determination of Al, Co, Cr, Cu, Mo, Ni, Ti, V, As, Sb, Sn and Pb. Accuracy of method reaches 0.0005%. (S11; CI-a)

235-S. (German.) **Measuring Specific Iron Radiation in Activated Ore.** Heinz Ramthun and Horst Scheiwe. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 165-167.

Testing stability of agglomerate by measuring iron radiation in blast furnace dust using radioactive labeling of test agglomerate. Experimental technique, preparation of specimens, measuring technique and accuracy. Iron dust exhaust from hard foamed sinter is 4.5% from briquettes 13.5%. (S19, A8a; Fe, RM-n)

236-S.* (German.) **Photometric Determination of Iron in Pure Tin and Tin Melts Used for Tinning Sheet Steel.** Heinrich Ploum. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 169-172.

Recently developed photometric method for determining small amount of iron using thioglycolic acid. Optic behavior of iron-thioglycolic-acid solution. Estimation of calibration curve. Influence of accompanying substances and of hydrolysis on accuracy of method. Test technique. (S11a; Sn, *Fe*)

237-S. (German.) **Use of Proportional Counters and Impulse Height Discrimination on Counting Tube Goniometer.** Franz Bollenrath and Hans Krings. *Archiv für das Eisenhüttenwesen,* v. 29, Mar. 1958, p. 189-191.

Increase of line intensity compared with the one of the background using a xenon proportional counter with impulse height discrimination. Susceptibility of the apparatus in detection of impurities increased. Method requires use of chromium radiation. (S19, X2n; 9-51)

238-S. (Italian.) **Control of Galvanizing Solutions With the Hull Cell.** Gianfranco Riboldi. *Galvanotecnica,* v. 9, Feb. 1958, p. 39-45.

(S11g, L16)

239-S. (Russian.) **Determination of Germanium in Ores, Coal and Industrial Waste Products.** V. A. Nazarenko, N. V. Lebedeva and R. V. Ravitskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 9-13.

11 ref. (S11j; *Ge,* RM-n)

240-S. (Russian.) **Complexometric Determination of Thorium.** A. I. Busev, L. V. Kiseleva and A. I. Cherkesov. *Zavodskaya Laboratoriya,* Jan. 1958, p. 13-16.

9 ref. (S11j; Th)

241-S. (Russian.) **Photocolorimetric Determination of Bismuth in Tin.** M. I. Shvaiger, V. P. Paklina and A. S. Medvedeva. *Zavodskaya Laboratoriya,* Jan. 1958, p. 16-17.

(S11a; *Bi,* Sn)

242-S. (Russian.) **Quick Method for Determination of Copper, Lead and Zinc in Metallic Ores.** S. Yu. Fainberg, A. A. Blyakhman and L. N. Filatova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 18-20.

6 ref. (S11j; *Cu, Pb, Zn,* Rm-n)

243-S. (Russian.) **Separation of Zinc and Cobalt.** Yu. V. Morachevskii and Z. S. Bashun. *Zavodskaya Laboratoriya,* Jan. 1958, p. 20-21.

(S11f; Co, Zn)

244-S. (Russian.) **Colorimetric Determination of Cementite Content of Steel.** N. M. Popova and L. V. Zaslavskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 26-29.

(S11a; ST, 14-68)

245-S. (Russian.) **Thermo-Electric Determination of Carbon in Steel During Smelting.** P. D. Korzh and A. P. Ershova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 41-43.

(S16j; ST, *C*)

246-S. (Russian.) **Radiochemical Determination of Sulphur Inclusion in**

Electroplated Deposits of Nickel and Copper. A. A. Sütyagina. *Zavodskaya Laboratoriya,* Jan. 1958, p. 43-44.

6 ref. (S19; *S,* Cu, Ni, 8-62, 9-69)

247-S. (Russian.) **Quality Control of Steel Heat Treatment by Magnetic Testing.** A. M. El'gard and S. K. Ginsburg. *Zavodskaya Laboratoriya,* Jan. 1958, p. 96-101.

4 ref. (S13j; J-general; ST)

248-S.* **Determination of Gases in Molybdenum.** M. W. Mallett and W. R. Hansen. Paper from "The Metal Molybdenum", American Society for Metals, p. 365-392.

Sensitive and accurate apparatus for vacuum-fusion analysis of Mo for oxygen, hydrogen and nitrogen. At gas volumes less than 0.5 ml. and in the range 0.5 to 2.5 ml. to the apparatus is sensitive to a change of 0.005 ml. and in the range 0.5 to 2.5 ml. to a change of 0.01 ml. Changes of 0.0005 ml. can be detected at gas volumes of 0.05 ml. 8 ref.

(S11r, 1-53; Mo, *O, H, N*)

249-S. **Comparison of Wet With Spectro-Analytical Methods for Total Aluminum in Steel.** M. Lacomble and L. Dor. *Revue Universelle Des Mines,* v. 11, no. 2, 1955, p. 86-97. (Henry Brutcher, Altadena, Calif., Translation no. 3810.)

(S11b, S11k; ST, *Al*)

250-S. **Experience in Nondestructive Testing of Welded Tubes.** H. D. Weise. *Schweissen und Schneiden,* v. 8, no. 10, 1956, p. 355-363. (Henry Brutcher, Altadena, Calif., Translation no. 4073.)

Merits of testing welds in tubes by radiation methods, ultrasound, X-ray and gamma-ray inspection. (S13; 7-51, 4-60)

251-S. **Inspection of Castings With Radioisotopes.** B. B. Gulyaev and L. G. Demina. *Liteinoe Proizvodstvo,* no. 9, Sept. 1956, p. 18-20. (Henry Brutcher, Altadena, Calif., Translation no. 4078.)

(S13e, 1-59; 5-60)

252-S.* (Czech.) **Thickness Measurment of Tin and Lead Coatings in a Radioisotope Back-Reflection Process.** Jaromir Kuba and Jaroslav Hladik. *Hutnické Listy,* v. 13, Mar. 1958, p. 230-233.

S^{35}, Tl^{204}, Sr + Y^{90}, and Ru + Rh^{106} were used to determine thickness ranges of Sn and Pb coatings. Thickness of the base material cannot be greater than the so-called final thickness. For measurement of currently manufactured Sn and Pb coatings, Tl^{204} is best among the isotopes available. 7 ref. (S14e, 1-59; *Pb, Sn,* 8)

253-S. (French.) **Automatic Factory Inspection of Soft Steel Billets by Electromagnetic and Ultrasonic Methods.** V. Husarek and L. Beaujard. *Publications de l'Institut de Recherches de la Sidérurgie,* Series A, no. 132, May 1957.

To insure uninterrupted movement along conveyer to rolling mill, defective billets must be eliminated. Electromagnetic and ultrasonic inspection methods can be applied for more accurate knowledge of qualities of first choice and lower grade lots, decrease in visual inspection costs, elimination of incidents in rolling due to defects, and quality improvement of finished product. These benefits largely offset installation and operation costs of the inspection systems. (S13g, S13h; ST, 5-59)

254-S.* (German.) **Ultrasonic Testing of Aluminum Workpieces.** W. Boehme. *Aluminium,* v. 34, Apr. 1958, p. 200-205.

Convenient and robust testing rig for scanning defects inside workpieces, surface defects and testing of joints. Ultrasonic testing has advantage that mechanical millimeter waves can penetrate much further than high-frequency electromagnetic waves and thus detect finer discontinuities than with X-rays and gamma rays. 7 ref. (S13g; Al)

255-S. (German.) **Spectrochemical Determination of Phosphorus in Steel With the Phosphorus Line at 3175 Angstrom.** *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 89-94.

20 ref. (S11k; ST, *P*)

256-S. (German.) **Determination of Oxygen in Titanium.** Hans G. Lange von Stocmeier. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 95-100.

Critical review. 28 ref. (S11; Ti, *O*)

257-S. (German.) **Chromatographic Analysis of Gases. A Modern, Time-Saving Method.** W. Schuhknecht. *Archiv für das Eisenhüttenwesen,* v. 29, Feb. 1958, p. 101-106.

Apparatus automatically registers the components of any gas by means of the varying heat conductivity of these components. 3 ref. (S11r)

258-S.* (German.) **Industrial Suitability of Hydrochloric Acid Test for Differentiating Converter and Open-hearth Steels.** E. Rubo. *Werkstattstechnik und Maschinenbau,* v. 48, Mar. 1958, p. 165-169.

Basic principles; experimental technique and effect of its modifications. Advantages include low expense, saving in time, relatively high reliability. (S10a; ST-e, ST-g)

259-S. (Hungarian.) **Technology of Producing Dynamo and Transformer Sheets. Pt. 3.** Neuhöffer Ernö. *Kohaszati Lapok,* v. 13, Jan. 1958, p. 6-10.

(S-general, S22; ST, SGA-n, 4-53)

260-S. (Japanese.) **Determination of Magnesium in Aluminum Alloys by Photometric Titration.** Teruyuki Kanie. *Japan Analyst,* v. 6, Nov. 1957, p. 711-715.

(S11a; *Mg,* Al-b)

261-S. (Japanese.) **Determination of Nonmetallic Inclusions in Iron and Steels by Iodine Method.** S. Malkawa and M. Ebihara. *Japan Analyst,* v. 6, Nov. 1957, p. 715-719.

(S11; ST, 9-69)

262-S. (Japanese.) **Photometric Determination of Titanium in Metallic Aluminum and Its Alloys.** Yoshiyo Kakita, Minora Hosoya and Minoric Amano. *Japan Institute of Metals, Journal,* v. 21, Aug. 1957, p. 501-503.

Use of sodium alizarinsulphonate and stannous chloride in acidic solution of hydrochloric acid. (S11a; *Ti,* Al-b)

263-S. (Russian.) **New Method of Determining Stannic Sulphide in Ores.** L. V. Zverev and N. V. Petrova. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1403-1405.

Advantages of using carbon tetlochloride instead of acidic solution. 6 ref. (S11j; *Sn,* RM-n)

264-S. (Russian.) **Accelerated Method of Isolating the Carbide Phase in Steel.** O. S. Spiridonova and T. I. Bezuglova. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1412-1413.

Use of electrolysis, with specimen in solution of 50% caustic soda, reduces time from 6 or 8 hr. to 40 min. (S11g; ST)

265-S. (Russian.) **Ultramicro Analysis.** I. P. Alimarin and M. N. Petrikova. *Zavodskaya Laboratoriya,* Jan. 1958, p. 29-32.

Literature review. 47 ref. (S11d)

266-S. (Book.) **Radioisotopes.** Sidney Jefferson. 110 p. 1958. Philosophical Library Inc., 15 East 40th St., New York 16, N. Y. $4.75.

Industrial applications include radioactive markers; detection of leaks; thickness measurements; levels and density gages; radiography and autoradiography; static discharge and ionization; fission products. Elementary fundamentals of radioactivity-atomic structure; health precautions. (S-general, 1-59, P18, A7r; 14-63)

267-S. **Improved Vacuum-Fusion Method for the Determination of Oxygen and Nitrogen in Metals.** Nev A. Gokcen. *AIME Transactions,* v. 212, Feb. 1958, p. 93-100.

Construction and operation of a simple and accurate vacuum-fusion apparatus. Limits of interference of Mn, Al, and Ti, and the effects of Sn and water-cooling of the furnace tube have been investigated in detail. 73 ref. (S11r)

268-S. **Ultrasonics—the Key to Locating Defects in Metal Structure.** Robert N. Hafemeister. *Allis-Chalmers Electrical Review,* v. 22, no. 4, 1957, p. 20-24.

(S13g)

269-S. **The Absorptiometric Determination of Traces of Iron in Bismuth.** E. Booth and T. W. Evett. *Analyst,* v. 83, Feb. 1958, p. 80-82.

7 ref. (S11; Bi, *Fe*)

270-S.* **Micro Procedure for the Electrolytic Determination of Lead in Copper-Base Alloys.** H. C. J. Saint. *Analyst,* v. 83, Feb. 1958, p. 88-92.

Conditions affecting the electrolytic deposition of micro-amounts of lead as peroxide in Cu-base alloys, particularly brass. 5 ref. (S11g, Cu-b, *Pb*)

271-S. **The Spectrophotometric Determination of Nickel in Copper-Nickel Alloys.** G. R. Sutcliffe and D. M. Peake. *Analyst,* v. 83, Mar. 1958, p. 122-125.

The optical density of the sample solution in a nitric-phosphoric acid medium is measured at 3950 Å, where absorption is due almost entirely to Ni. A similar measurement is made on the same solution at 4900 Å, where neither Cu nor Ni absorb, and this permits a background correction to be made. Method applied to copper alloys with Ni content from about 1.5 to 30%; a single determination can be completed in about 30 min., as opposed to 3 hr. by gravimetric procedure. (S11k; *Ni,* Cu-b)

272-S. Volumetric Determination of Uranium in Presence of Iron. M. W. Desai and T. K. S. Murthy. *Analyst,* v. 83, Mar. 1958, p. 126-129.

Oxidation of reduced uranium with ferric sulphate and titration of the excess of ferric iron iodimetrically. Osmium tetroxide is a suitable catalyst. 11 ref. (S11j; *Fe,* U)

273-S. A Spectrochemical Solution Method for the Determination of Copper, Cobalt and Iron in Copper and Cobalt Concentrates. G. L. Mason and Z. De Beer. *Analyst,* v. 83, Mar. 1958, p. 129-135.

A solution method of spectrochemical analysis of Cu and Fe in Cu and Co concentrates over the range 5.0 to 40.0%, and 0.2 to 6.0% Co. Results show good agreement with chemical analyses, but reproducibility varies, according to the element and its concentration. The time for one analysis is 1 hr., and 20 samples can be analyzed. 10 ref. (S11k; Cu, Fe, Co)

274-S. Analysis of Rare Earth Mixtures by a Recording Spectrophotometer. D. C. Stewart and Dorothy Kato. *Analytical Chemistry,* v. 30, Feb. 1958, p. 164-172.

Multiple tracing light absorption curves of the rare earth chlorides in solution (except lanthanum, promethium and lutecium), taken with the Beckman DK recording spectrophotometer, permit direct evaluation of interferences. 9 ref. (S11a; EG-g)

275-S. X-Ray Fluorescent Spectrometric Determination of Yttrium in Rare Earth Mixtures. Robert H. Heidel and Velmer A. Fassel. *Analytical Chemistry,* v. 30, Feb. 1958, p. 176-179.

10 ref. (S11p; *Y,* EG-g)

276-S. Emission Spectrometric Determination of Oxygen in Titanium and Titanium Alloys. Velmer A. Fassel and William A. Gordon. *Analytical Chemistry,* v. 30, Feb. 1958, p. 179-182.

Method based on the direct current carbon arc excitation of a special electrode assembly which provides a molten platinum bath after arc is initiated. 17 ref. (S11; Ti, *O*)

277-S. Automatic Determination of Uranium in Process Streams. H. W. Bertram, M. W. Lerner, G. J. Petretic, E. S. Roszkowski and C. J. Rodden. *Analytical Chemistry,* v. 30, Feb. 1958, p. 354-359.

An automatic instrument composed of a derivative polarograph and a sampling and proportioning system. The derivative polarograph, based upon the resistance-capacitance circuit, scans the applied voltage in a reverse direction to decrease peak oscillations. Concentrations of uranium are recorded at 5-min. intervals. Factors affecting the precision and accuracy are briefly discussed. 13 ref. (S11m, S18q, 1-52; U)

278-S. Photometric Determination of Chromium in Electronic Nickel. C. L. Luke. *Analytical Chemistry,* v. 30, Mar. 1958, p. 359-361.

Determination of 0.001 to 0.02% Cr in Ni. Chromium is oxidized to the sexivalent state, Ni is removed by precipitation as nickel ammonium perchlorate, and the chromate in the filtrate is determined by the photometric diphenylcarbazide method. (S11a; *Cr,* Ni)

279-S. Volumetric Determination of Magnesium in Titanium. M. J. Miles, W. J. Mesimer and Mae Atkin. *Analytical Chemistry,* v. 30, Mar. 1958, p. 361-363.

8 ref. (S11j; *Mg,* Ti)

280-S. Determination of Oxygen in Titanium-Modified Vacuum Fusion Apparatus and Platinum Bath Technique. S. J. Bennett and L. C. Covington. *Analytical Chemistry,* v. 30, Mar. 1958, p. 363-365.

7 ref. (S11r; Pt, Ti-b, *O*)

281-S. Rare Earths in Purified Thorium and Uranium Preparations. Chemical Isolation and Spectrographic Determination. Cyrus Feldman and Janus Y. Ellenburg. *Analytical Chemistry,* v. 30, Mar. 1958, p. 418-422.

10 ref. (S11k; *EG-g,* Th, U)

282-S. Coulometric Reduction of Oxides on Tin Plate. Robert P. Frankenthal, Thomas J. Butler and Raymond T. Davis, Jr. *Analytical Chemistry,* v. 30, Mar. 1958, p. 441-443.

11 ref. (S11g; *O,* Sn, 8-65)

283-S.* Determination of Rare Earth Impurities in Thorium by Spectrographic Methods. L. W. Wray. *Atomic Energy of Canada Limited,* AECL no. 546, Aug. 1957, 26 p.

Before spectrographic examination the impurities are freed from the thorium matrix by removing the bulk of the Th by extraction with TBP-CCl_4 and the remainder by extraction with TTA-C_6H_6. This results in a consistent recovery of rare earths of about 85% with an

average sensitivity of 0.2 ppm. 16 ref. (S11k; Th, EG-g, 9-51)

284-S. Determination of Rare Earth Impurities in Thorium by Spectrographic Methods. L. W. Wray. *Atomic Energy of Canada Limited,* CRDC-742, Aug. 1957, 14 p.

16 ref. (S11k; Th, EG-g, 9-51)

285-S. Analytical Chemistry of Copper and Alloys. *Chemical Age,* v. 79, Feb. 1958, p. 317-318.

19 ref. (S11; Cu)

286-S. Plating Test Determines Degree of Cleanliness of Wire Surfaces. Merton Allen. *Insulation,* v. 4, Mar. 1958, p. 10-11.

12 ref. (S15, 4-61)

287-S. X-Rays Will Measure "Blind" Dimensions Accurately. *Iron Age,* v. 181, May 15, 1958, p. 78-80.

(S14e)

288-S. Nondestructive Testing of Steel Castings for Elevated Temperature Service. *Mechanical Engineering,* v. 80, Apr. 1958, p. 66-70.

14 ref. (S13; SGA-h, ST, 5-60)

289-S. Vacuum-Fusion Analysis for Oxygen in Titanium. W. R. Hansen, M. W. Mallett and M. J. Trzeciak. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121638, Dec. 1957, 28 p. $.75.

(S11r; Ti, *O*)

290-S. Development of a Nondestructive Test for Evaluation of Adhesion of Electrodeposits on Steel as in Silver-Plated Aircraft Bearings. A. L. Walters and S. A. Wenk. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131226, Nov. 1953, 65 p.

Ultrasonic method.
(S13g, L17; *Ag,* ST)

291-S. The Direct Determination of Oxygen and Nitrogen in Titanium and Titanium Alloys Using Bromine Trifluoride. Armour Research Foundation. (Watertown Arsenal.) *U. S. Office of Technical Services,* PB 131290, Jan. 1957, 16 p. $.50.

(S11r; Ti, *O*)

292-S. Research and Development Leading to the Establishment of Ultrasonic Test Standards for Aircraft Materials. A. D. Guinn, R. D. McKown, J. C. Folz and W. C. Hitt. Ultrasonic Testing and Research Laboratory, Wright Air Development Center. *U. S. Office of Technical Services,* PB 131564, Oct. 1957, 133 p. $3.50.

(S13g, S22, T24)

293-S. Effective Thickness of Chromium Plate on the Sensitivity of Magnetic Particle Inspection. W. Steindorf and B. Cohen. Wright Air Development Center. *U. S. Office of Technical Services,* PB 131608, Oct. 1957, 13 p. $.50.

Plate thickness of 4.5 mils was established as a practical limitation for effective crack detection.
(S13j; ST, *Cr,* 8-62)

294-S. Reactor Fabrication Demands New Quality Control Methods. R. E. Lorentz. *Western Metalworking,* v. 16, Apr. 1958, p. 53.

(S12, T26q, W11p; SS)

295-S. Automatic Electromagnetic and Ultrasonic Inspection of Steel Billets. V. Husarek. *Stahl und Eisen,* v. 77, no. 21, 1957, p. 1483-1487. (Henry Brutcher, Altadena, Calif., Translation no. 4110.)

Previously abstracted from original. See item 33-S, 1958.
(S13g, S13h, CN-g; 4-52, 4-55)

296-S. Determination of Oxygen in Pig and Cast Irons. H. Goto. *Tetsu to Hagane,* v. 42, no. 1, 1956, p. 49-52. (Henry Brutcher, Altadena, Calif., Translation no. 4112.)

Application of fractional vacuum-fusion method to the determination of the separate oxides.
(S11g; CI, *O*)

297-S. Analysis of Steel for Gases by the Vacuum-Heating Method. Yu. A. Klyachko. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1410-1412. (Henry Brutcher, Altadena, Calif., Translation no. 4130.)

(S11r; ST)

298-S. Taking Samples From Semi-finished Steel for Hydrogen Analysis. A. N. Morozov. *Zavodskaya Laboratoriya,* v. 22, No. 7, 1956, p. 867-869. (Henry Brutcher, Altadena, Calif., Translation no. 4131.)

S11; *H,* ST)

299-S. Comparative Evaluation of Methods for Determining Gases in Steel. Yu. A. Klyachkov, L. L. Kunin and E. M. Chistyakova. *Zavodskaya Laboratoriya,* v. 23, no. 8, 1957, p. 905-907. (Henry Brutcher, Altadena, Calif., Translation no. 4133.)

Previously abstracted from original. See item 68-S, 1958. (S11r; ST)

300-S. Relation Between Permeability of Rolling-Stock Axles to Ultrasound and Properties of Steel. H. Nakamura and R. Inoue. *Tetsu to Hagane,* v. 43, no. 9, 1957, p. 1074-

1076. (Henry Brutcher, Altadena, Calif., Translation no. 4159.)

Difficulties encountered in the ultrasonic testing of rolling-stock components of intrinsically low permeability to ultrasound. (S13g, T7j)

301-S. Ultrasonic Inspection of Steel Slabs. Pt. 1. Y. Sasaki. *Tetsu to Hagane,* v. 43, no. 9, 1957, p. 1073-1074. (Henry Brutcher, Altadena, Calif., Translation no. 4160.)

New apparatus and procedure for speedy scanning. (S13g; ST, 5-59)

302-S. New Process for Sampling Killed and Rimming Steel for Determination of Oxygen and Hydrogen. Hermann Schenk, Karl Heinz Gerdom and Klaus-Gunther Schmitz. *Archiv für das Eisenhüttenwesen,* v. 28, Mar. 1957, p. 123-125. (Iron and Steel Institute Translation no. 630.)

Previously abstracted from original. See item 366-S, 1957. (S12h, S11r, 1-53; ST, *O, H*)

303-S. Research on the Hydrogen Analysis of Iron and Steel by Low Pressure and Constant Volume Method. Toyosuke Tanoue, Munezo Matsuba and Shunsuke Inoue. *Sumitomo Metals,* v. 8, Oct. 1956, p. 255-260. (Iron and Steel Institute Translation no. 687.)

Previously abstracted from original. See item 105-S, 1957. (S11r; Fe, ST, *H*)

304-S. Contribution to the Study of the Analytical Behavior of Nitrides in Steels. P. Tyou. *Revue Universelle des Mines, de la Mecanique, de la Metallurgie,* v. 99, Dec. 1956, p. 641-652. (Iron and Steel Institute Translation no. 722.)

Previously abstracted from original. See item 104-S, 1957. (S11; ST, N, 14-8)

305-S. Sensitive Determination of Carbon With a Recording Conductivity Instrument. Walter Koch and Hanns Malissa. *Archiv für das Eisenhüttenwesen,* v. 27, Nov. 1956, p. 695-700. (Iron and Steel Institute Translation no. 773.)

Previously abstracted from original. See item 80-S, 1957. (S11g; ST, CI, *C*)

306-S. Some Considerations on the Interpretation of Ultrasonic Tests Used for Discovering Defects in Steel. E. Marianeschi and T. Tili. *Metallurgia Italiana,* v. 49, Apr. 1957, p. 275-289. (Iron and Steel Institute Translation no. 896.)

Previously abstracted from original. See item 310-S, 1957. (S13g; ST)

307-S. (French.) **Determination of Carbon in Steels by Means of Combustion and Conductometry.** R. Boulin. *Chimie Analytique,* v. 40, Mar. 1958, p. 72-76.

6 ref. (S11g; ST, *C*)

308-S. (French.) **Electrolytic Determination of Tin Deposits on Copper Wires.** Robert Hourquin. *Cuivres-Laitons-Alliages,* no. 42, Mar-Apr. 1958, p. 33-35.

(S14c, Cu, Sn, 4-61, 8-65)

309-S. (French.) **Research on Surface Roughness After Machining.** l'Abbe Cayere. *Machine Moderne,* v. 52, Apr. 1958, p. 41-51.

(S15, G17)

310-S. (French.) **Spectral Analysis of Metals. Apparatus Used; Spectroscopes, Spectrographs, Direct-Reading Spectrometers.** *Machine Moderne,* v. 52, Apr. 1958, p. 67-79.

(Concluded.) (S11k, 1-53)

311-S. (French.) **Image Quality in the Radiography of Heavy Sections of Steel Using High-Energy Radiation.** G. Chanty and E. Mencarelli. *Revue de Metallurgie,* v. 55, Mar. 1958, p. 218-226.

Exposure needed and the image quality obtained in the radiography of steel over 100 mm. thick using high-energy radiation sources. Comparison between results obtained and those given for the same thicknesses of steel, either 100 or 200 mm. by cobalt-60 radiation in terms of both exposure time and image quality. 9 ref. (S13e; ST)

312-S. (German.) **Determination of Magnesium in Aluminum.** H. Birtel. *Aluminium,* v. 34, Apr. 1958, p. 207-208.

5 ref. (S11j, Al, *Mg*)

313-S. (German.) **Some Basic Principles for Quality Standardization of Spur-Gears.** H. Weinhold. *Fertigungstechnik,* v. 8, Feb. 1958, p. 80-92.

8 ref. (S12, T7a)

314-S. (German.) **Influence of Test Specimen Preparation Upon the Chemical Analysis of Gray Cast Iron.** Herbert Auerbach. *Giessereitechnik,* v. 4, Feb. 1958, p. 35-37.

3 ref. (S11, 1-60; CI)

315-S. (German.) **Trends and Developments in the Use of Heat Measurement and Regulating Apparatus in Ironworks.** Hans Weineck. *Stahl*

und Eisen, v. 78, Apr. 17, 1958, p. 494-505.

Measuring and regulating equipment in large capacity pusher-type heating furnaces; safety controls, effects on production and costs, choice of auxiliary power. (S16, X-9; ST)

316-S. (German.) **A New Method for Measuring Wall Thickness and Sound Velocity.** Ludwig Niklas. *Zeitschrift für Metallkunde*, v. 49, Mar. 1958, p. 152-155.

Supersonic echo measuring method. (S14g)

317-S. (Japanese.) **Rapid Spectrochemical Analysis of Silicon in Molten Steel.** Yutaka Terauchi. *Sumitomo Metals*, v. 9, Oct. 1957, p. 221-230.

13 ref. (S11k, X21; ST, *Si*)

318-S. Determination of Very Small Amounts of Carbon in Metals. Robert E. Fryxell. *Analytical Chemistry*, v. 30, Jan. 1958, p. 273-275.

Controlling the combustion temperature with a variable transformmer significantly improves precision of measurement. 7 ref. (S11m; C)

319-S. Chemical Analysis of Cupola Slags. Pt. 2. Determination of Calcium and Magnesium Oxides. W. E. Clarke. *British Cast Iron Research Association, Journal of Research and Development*, v. 7, Apr. 1958, p. 249-256.

18 ref. (S11j, E10a; CI, RM-q)

320-S. Nondestructive Testing. C. B. Jenni. *Mechanical Engineering*, v. 80, Apr. 1958, p. 66-70.

Visual examination, radiography, magnetic particle examination and ultrasonic inspection. Techniques, applications, practical hints. (S13)

321-S. Determination of Oxygen in Titanium by the Micro Bromination Method. Mitsunao Takahashi, Makoto Kawane and Tetsuo Mitsui. *Mikrochimica Acta*, no. 5, Jan. 1957, p. 647-657.

18 ref. (S11d; *O*, Ti)

322-S. Inclusions in Uranium Metal. K. E. G. Meredith and M. B. Waldron. *United Kingdom Atomic Energy Authority, A.E.R.E.* M/M 156, 1957, 16 p.

Precise differentiation of the precipitates formed by the U-Fe, U-Si and U-Al compounds is not always possible. Uranium hydride and calcium or magnesium fluoride can be identified with fair certainty when in sufficient quantity. 39 ref. (S11; U, 9-69)

323-S. Self-Imposed Welding Standards. *Welding Engineer*, v. 43, Apr. 1958, p. 54, 56, 59.

(S22, K-general)

324-S. (French.) **Fast, Simple Method of Analyzing Antifriction Metals.** M. E. Garate and M. T. Garate. *Chimie Analytique*, v. 40, Mar. 1958, p. 77-79.

(S11; Cu, Pb, Sb, Sn, SGA-c)

325-S. (German.) **Separation of Rare Earths. Pt. 4. Separation of Rare Earths With Cation Exchangers.** Leopold Werner and Joachim Massonne. *Journal für Praktische Chemie*, v. 5, Oct. 1957, p. 14-20.

(S11f; EG-g)

326-S.* (German.) **Determination of Chromium (III) Content of Chromium Bath and of Other Solutions Containing Chromic Acid.** R. Weiner and E. Ney. *Metallwaren-Industrie und Galvanotechnik*, v. 49, Apr. 1958, p. 140-143.

Origin of trivalent Cr in electrolytic baths. Chromium (III) content as criterion of correct operating. Disadvantages of gravimetric and usual titrometric methods. Modern complexometric method and its technique in the presence of chromic acid and in its absence. (S11; *Cr*, L17a)

327-S. (German.) **Nondestructive Testing of Wire Rope.** Eugen Hanke. *Neue Hütte*, v. 3, Mar. 1958, p. 173-179.

Literature review. Methods using alternating current—absolute and comparative measuring, measuring of radial component. Methods using direct current—absolute measuring, oscillating spool method, measuring of radial component. Advantages and disadvantages of various methods. (26 ref. (S13, 4-61)

328-S. (German.) **Supersonic Testing of Welds.** W. H. Papke. *Schweissen und Schneiden*, v. 10, Apr. 1958, p. 131-135.

Impulse-echo method. (S13g; 7-51)

329-S. (German.) **Spectrochemical Determination of Columbium and Titanium in Tantalic Acid.** K. Jordan and K. Picard. *Technische Mitteilungen Krupp*, v. 15, no. 7, Dec. 1957, p. 203-207.

13 ref. (S11; Cb, Ti, Ta)

330-S.* (Japanese.) **The Cathode Ray Tube Type Ultrasonic Thickness Gage and Its Application to Nondestructive Inspection.** Noboru Niwa. *University of Tokyo, Institute of Industrial Science, Report*, v. 7, Feb. 1958, 67 p.

Thickness measurement of plates and tubes of steel, Al and Cu, Pb sheath of cable; corrosion inspection of tank walls and high-pressure gas vessels; detection of lamination and other flaws in thin metal plates; inspection of contact surface of two metal plates. (S14g, S13, X20c)

331-S. (Rumanian.) **Rational Analysis of Lead, Copper and Zinc Ores.** M. Ionescu and Roman Pavel. *Revista Minelor*, v. 9, Jan. 1958, p. 39-44.

(S11; Cu, Pb, Zn, RM-n)

332-S. (Russian.) **Determination of Copper With Aid of Lead Diethyldithiocarbanate.** S. E. Kreimer and L. P. Butylkin. *Zavodskaya Laboratoriya*, v. 24, Feb. 1958, p. 131-133.

(S11j; *Cu*)

333-S. (Russian.) **Amperometric Determination of Molybdenum and Tungsten in Presence of Nickel.** A. K. Babko and A. I. Volkova. *Zavodskaya Laboratoriya*, v. 24, Feb. 1958, p. 135-137.

6 ref. (S11j; *Mo, W, Ni*)

334-S. (Russian.) **Amperometric Titration of Cobalt With Potassium Ferrocyanide.** A. K. Zhdanov, V. A. Khadeev and G. P. Moiseeva. *Zavodskaya Laboratoriya*, v. 24, Feb. 1958, p. 137-140.

6 ref. (S11j; *Co*)

335-S. (Russian.) **Amperometric Determination of Cobalt in Magnetic Alloys.** V. F. Toronova and O. S. Strekalova. *Zavodskaya Laboratoriya*, v.24, Feb. 1958, p. 140-141.

(S11j; *Co*, SGA-n)

336-S. (Russian.) **Colorimetric Determination of Titanium in Alloy Steel.** A. I. Lazarev and V. I. Lazareva. *Zavodskaya Laboratoriya*, v. 24, Feb. 1958, p. 145-146.

(S11a; *Ti*, AY)

337-S. (Russian.) **Development of the Analytical Method of Amperometric Titration.** O. A. Songina. *Zavodskaya Laboratoriya*, v. 24, Feb. 1958, p. 160-166.

General review of literature in USSR and abroad with emphasis on application of method to metallurgy. 93 ref. (S11j)

338-S. (Russian.) **Capacity Test for Determination of Thickness of Varnish Coating on Metals.** I. L. Rosenfel'd and Yu. P. Ol'khovnikov. *Zavodskaya Laboratoriya*, v. 24, Feb. 1958, p. 173-176.

(S14c; 8-70)

339-S. (Russian.) **Determination of Cobalt and Cadmium in Pure Nickel.** S. E. Kreimer, N. V. Tuzhilina, V. A. Golovina and R. A. Tyabina. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 262-264.

Advantages in use of solution of diontipirilmethane and ammonium thiocyanate as against the colorimetric method. 5 ref.

(S11a, S11j; *Cd, Co*, Ni-a)

340-S. (Russian.) **Colorimetric Determination of Copper in Nickel Electrolytes.** A. N. Busev, M. I. Ivanyutin and Y. M. Feigina. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 265-266.

(S11a; *Cu*, Ni)

341-S. (Russian.) **Volumetric Determination of Gallium by Vanadium Atometric Method.** S. Ya. Vinkovetskaya and V. A. Nazarenko. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 268-270.

9 ref. (S11j; *Ga*)

342-S. (Russian.) **Microtensiometric Determination of Silver With Aid of Triazole.** L. N. Lomakina, N. I. Tarasevich and P. K. Agasyan. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 270-273.

5 ref. (S11d; *Ag*)

343-S. (Russian.) **Colorimetric Determination of Selenium and Tellurium in Lead Dust.** V. P. Gladyshev. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 275-278.

7 ref. (S11a; Pb, *Se, Te*)

344-S. (Russian.) **Determination of Indium in Sphalerite Concentrates by Amperometric Titration.** B. S. Tsyvina and V. M. Vladimirova. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 278-280.

6 ref. (S11j; *In*, RM-n)

345-S. (Russian.) **Radiometric Titration of Zinc and Cadmium With Potassium Ferrocyanide.** I. M. Gibalo and V. M. Byr'ko. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 281-283.

5 ref. (S11j; Cd, Zn)

346-S. (Russian.) **Electro-Induction Device for Disclosing Fissures in Parts of Nonmagnetic Alloys.** L. N. Suvorov. *Zavodskaya Laboratoriya*, v. 24, Mar. 1958, p. 354-356.

(S13c, 1-53)

347-S.* **Should Ultrasonic Inspection Be Used to Augment Radiography in the Inspection of Weldments in High-Pressure Piping.** R. L. Steele. Digest from ASME Annual Meeting, Paper 57-A-195, Oct. 1, 1958. *Mechanical Engineering*, v. 80, Mar. 1958, p. 111-112.

Root cracks cannot be detected satisfactorily by radiography even though a radiograph of the root pass is made. Ultrasonic inspection locates the crack positively. Ultrasonic inspection of field welds is also satisfactory. A possible crack was detected, which was very small, that was in no way indicated on the radiograph of the same joint. (S13g, S13e; 7-51)

348-S.* Composite Procedure for the Determination of Mo, Ni, Mn, Fe, Cr, Sn, V and N in Titanium Alloys. George Norwitz and Maurice Codell. *Metallurgia,* v. 57, May 1958, p. 261-267, 269-270.

Nickel is determined colorimetrically or gravimetrically with dimethylglyoxime; Mn is determined by the periodate colorimetric method, or by titration with arsenite; Fe is determined colorimetrically or by titration; Cr is determined colorimetrically with diphenylcarbazide, or by titration with ferrous sulphate; nitrogen is determined volumetrically. 40 ref. (S11; Ti, *Mo, Ni, Mn, Fe, Cr, Sn, V, N*)

349-S. Separation and Determination of the Platinum Metals on a Microscale. A. D. Westland and F. E. Beamish. *Mikrochimica Acta,* no. 5, 1957, p. 620-639.

21 ref. (S11d; EG-c, Pt)

350-S. Method of Precipitation at Constant pH of Hydrated Oxides: Principle and Applications in Micro-Analysis of Chromium and Molybdenum. Motoharu Tanaka. *Mikrochimica Acta,* no. 2, Jan. 20, 1958, p. 204-211.

16 ref. (S11d; Cr, Fe, Mn, Mo)

351-S. Ultrasonic Testing of Sheets. Herman Josef Kopineck. *Stahl und Eisen,* v. 77, May 30, 1957, p. 727-734. (Iron and Steel Institute Translation no. 666.)

Previously abstracted from original. See item 322-S, 1957. (S13g; ST, 4-53.)

352-S. (English.) A New Photometric Determination of Microquantity of Antimony Using Fuchsin or Malachite Green. Hidehiro Goto and Yachiyo Kakita. *Tohoku University, Science Reports of the Research Institutes,* Series A, v. 10, Apr. 1958, p. 103-109.

(S11a; Sb)

353-S. (French.) Magnetic Methods for Detection of Impurities in Solids. L. Weil. *Bulletin de l'Institut International du Froid,* Supplement, Sept. 1956, p. 77-82.

6 ref. (S13h)

354-S. (French.) Microdetermination of Aluminum in Calcium. Helen Ostertag and Yvette Cappelliez. *Comptes Rendus,* v. 246, Mar. 10, 1958, p. 1550-1553.

6 ref. (S11d; *Al,* Ca)

355-S. (German.) Micro-Analytical Investigations in Iron Research. Pt. 3. Handling of Microgram Quantities in Metallurgical Research. Walter Koch, Hanns Malissa and Dagmar Ditges. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 785-794.

(S11d)

356-S. (German.) Separation of Difficult to Dissolve Precipitations in Highly Dilute Solutions. Carl Mahr and Horst Klamberg. *Archiv für das Eisenhuttenwesen,* v. 28, Dec. 1957, p. 795-800.

15 ref.
(S11a, S11d; Cd, Co, Fe, Ni, Pb)

357-S. (German.) Experiences With Flame Spectrometry for Determination of Calcium and Magnesium in Steel Laboratories. Karl Abresch and Walter Dobner. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 25-34.

24 ref. (S11k; ST, *Ca, Mg*)

358-S. (German.) Contribution Toward the Rapid Analysis of Blast Furnace Slags. Alfred Neuberger, Ernst Schoffmann and Karl Herkenhoff. *Archiv für das Eisenhüttenwesen,* v. 29, Jan. 1958, p. 35-39.

29 ref.
(S11a; *Ca, Fe, Mg, Mn, Si,* RM-q)

359-S. (Portuguese.) Chemical Analysis of Tin Solders. Venancio Ferreira Alves and Alfonso Buccheri. *ABM, Boletim da Associacao Brasileira de Metais,* v. 14, Jan. 1958, p. 139-148.

6 ref. (S11; Pb, Sb, Sn, SGA-f)

360-S. (Russian.) Trilonometric Determination of Iron in Ores and Agglomerates. N. G. Fesenko. *Zavodskaya Laboratoriya,* Jan. 1958, p. 25-26.

6 ref. (S11j; *Fe,* RM-n)

361-S. (Russian.) Determination of Boiler Plate Quality. V. I. Dorokhov, A. V. Lopatin and V. A. Molotkov. *Stal',* v. 18, Apr. 1958, p. 348-352.

(S13d; CN, 4-53)

362-S. (Russian.) Determination of Antimony in Purified Lead. Yu. Yu. Lur'e and T. V. Zaglodina. *Zavod-*

skaya Laboratoriya, v. 24, Feb. 1958, p. 133-134.
(S11a; Pb, *Sb*)

363-S. (Russian.) **Ultrasonic Testing of Adhesion of Babbitt to Bearings.** L. M. Yablonik. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 176-178.
(S13g, Q10c, T7d; Sn, 8-65)

364-S. (Russian.) **Determination of Copper, Bismuth, Antimony, Lead and Tin in Ferrotungsten.** N. M. Kostyanovskay and M. V. Babaev. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 254-255.
(S11; *Bi, Cu, Fe, Pb, Sb, Sn,* W, AD-n31)

365-S. (Russian.) **Trilonometric Determination of Nickel in Copper Alloy.** I. I. Kalinichenko. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 266-267.
(S11; *Ni,* Cu)

366-S. (Russian.) **Continuous Measurement of Metal Temperatures in Laboratory Induction Furnaces.** P. Ya. Sorokin and S. V. Mikhailikov. *Zavodskaya Laboratoriya,* v. 24, Mar. 1958, p. 311-312.
(S16b, X24f, 1-69)

367-S. (Pamphlet.) **The Measurement of Thickness.** George Keinath. National Bureau of Standards Circular 585. Jan. 20, 1958, 79 p. $.50. (Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

Physical parameters involved in the practical measurement of thickness, such as displacement, and general aspects of measurement, such as dynamic response. Methods treated in seven groups: mechanical, chemical, electrical, magnetic, optical, X-ray, and radioactive radiation; ranges, accuracy, advantages and limitations. (S14, X20)

368-S. (Book.) **Light Metals and Alloys B-7.** *American Society for Testing Materials,* 1958, 320 p. $3.75.

Ingots, castings, bars, rods, wire, shapes, forgings, pipes, tubes, sheet, plate, wrought products, filler metal and electroplating.
(S22; Al, Mg, Ti, EG-a39)

369-S. (Book.) **Metallic Electrical Conductors B-1.** *American Society for Testing Materials,* 1958, 334 p. $3.75.

Covered are Cu, Cu alloys, Cu-covered steel, Al and galvanized steel and iron.
(S22, T1b; Al, Cu, Fe, ST, SGA-r)

370-S. Spectrophotometric Determination of Rhodium and Platinum in Plutonium. Maynard E. Smith. *Analytical Chemistry,* v. 30, May 1958, p. 912-913.
(S11k; *Rh, Pt,* Pu)

371-S. Volumetric Determination of Aluminum in Presence of Iron, Titanium, Calcium, Silicon and Other Impurities. H. L. Watts. *Analytical Chemistry,* v. 30, May 1958, p. 967-970. 6 ref. (S11j; *Al*)

372-S. Separation and Spectrophotometric Determination of Microgram Amounts of Niobium. Glenn R. Waterbury and Clark E. Bricker. *Analytical Chemistry,* v. 30, May 1958, p. 1007-1009.
(S11k; Cb)

373-S. Gamma Spectrometric and Radiochemical Analysis for Impurities in Ultrapure Silicon. Barbara A. Thompson, Barbara M. Strause and Maurice B. Leboeuf. *Analytical Chemistry,* v. 30, June 1958, p. 1023-1026.
(S11c, S11q; Si-a, 9-51)

374-S. Determination of Zirconium in Titanium Alloys Using p-Bromo- or p-Chloromandelic Acid. Roland A. Papucci and Joseph J. Koingenberg. *Analytical Chemistry,* v. 30, June 1958, p. 1062-1064.
(S11j, Ti-b, *Zr*)

375-S.* Determination of Acid Soluble Aluminum in Steel. E. T. Saxer. *Blast Furnace and Steel Plant,* v. 46, May 1958, p. 489-492.
7 ref. (S11b; *Al,* ST)

376-S. Analytical Applications of Dutoit's Thermovolumetry. Pt. 2. Analysis of Zinc in Brass. Kumar Krishna Chatterji. *Indian Chemical Society, Journal,* v. 35, Jan. 1958, p. 57-62.
(S11j; Cu-n, *Zn*)

377-S. Control of Magnesium Alloy Castings. Chester Gadzinski and Richard W. Hooley. *Industrial Quality Control,* v. 14, Nov. 1957, p. 14-19.

Consideration of secondary controls; destructive testing, proof loading testing and chemical analysis, used to measure effectiveness of primary controls over physical properties of magnesium alloy casting. 4 ref. (S12, E-general; Mg-b)

378-S. Modern Spectrographic Analysis of Steel Works Materials. D. Manterfield. *Instrument Practice,* v. 12, Apr. 1958, p. 359-366.
(S11k; ST)

379-S. The Challenge of Standards in the Steel Industry. John W. Sullivan. *Magazine of Standards,* May 1958, p. 129-132.

Technical problems of standardization. (S22, ST)

380-S. Gamma Spectroscopy Applied to Radioactivation Analysis. Pt. 3. Determination of Cobalt in Iron Using Gamma-Gamma Coincidence Measurement. *United Kingdom Atomic Energy Authority,* AERE C/R 2377, 1958, 13 p. 10 ref. (S11q; *Co,* Fe)

381-S. Gamma-Radiography. The Economic Factors. L. Spiro. *Welding and Metal Fabrication,* v. 26, May 1958, p. 188-189.
(S13e, 17-53)

382-S.* (German.) Magnetic Separation of Electrolytically Isolated Structural Components of Metallic Materials. Walter Koch and Heinz Sundermann. *Archiv für das Eisenhüttenwesen,* v. 29, Apr. 1958, p. 219-224.
Apparatus and its operation. Technique of separation of cementite and special carbides. Chemical and radiological examination of separated particles. (S11f; ST)

383-S. (German.) Sources of Error in Determining Graphite in Gray Cast Iron. Herbert Auerbach. *Giessereitechnik,* v. 4, Mar. 1958, p. 60-61.
(S11; CI, *C*)

384-S. Differential Spectrophotometric Determination of Zirconium in Presence of Hafnium. Harry Freund and W. Floyd Holbrook. *Analytical Chemistry,* v. 30, Apr. 1958, p. 462-465.
(S11a, *Zr,* Hf)

385-S. Determination of Tantalum in Niobium. Mary Louise Theodore. *Analytical Chemistry,* v. 30, Apr. 1958, p. 465-467.
15 ref. (S11, Cb, *Ta*)

386-S. Polarographic Determination of Tin in Zirconium Alloys. John T. Porter. *Analytical Chemistry,* v. 30, Apr. 1958, p. 484-485.
(S11m, *Sn,* Zr-b)

387-S. Photometric Determination of Beryllium. Uno T. Hill. *Analytical Chemistry,* v. 30, Apr. 1958, p. 521-524.
(S11a, Be)

388-S. Conductometric Determination of Small Amounts of Oxygen in Titanium. Maurice Codell and George Norwitz. *Analytical Chemistry,* v. 30, Apr. 1958, p. 524-526.
17 ref. (S11j; Ti, *O*)

389-S.* A Portable Lamination Detector for Steel Sheet. B. O. Smith, A. P. H. Jennings and A. G. Grimshaw. *British Journal of Applied Physics,* v. 9, May 1958, p. 191-193.
Method of detecting laminations in steel sheet based on the distortion they cause in the flow pattern of an electric current through the sheet. Direct current is passed through the sheet between two contacts on opposing faces while the potential difference between two adjacent contacts is measured. This potential difference is very small in sound material but rises sharply if a lamination is present.
(S13c; ST, 4-53)

390-S. Government Specifications for Aluminum. *Design News,* v. 13, Apr. 14, 1958, p. 152.
Most frequently used Federal and U. S. military specifications and their nearest corresponding ASTM, SAE and AMS numbers, together with chemical analysis and specified forms. (S22; Al-b, 15-74)

391-S.* Cutting Costs Through Quality Control. Kenneth M. Smith. *Foundry,* v. 86, June 1958, p. 65-69.
Cost-saving advantages in a control program which measures statistically the influence of each sort of casting defect on the average of all jobs of a given type.
(S12, E-general, 17-23)

392-S. Instrumentation for Iron and Steel. B. O. Smith. *Iron and Coal Trades Review,* v. 176, May 16, 1958, p. 1147-1152.
(S18, S14, S16, D-general)

393-S. Determination of Niobium in the Presence of Large Amounts of Titanium. A. I. Ponomarev and A. Ya. Sheskolskaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 369-371.
Rapid and accurate method based on precipitation of Cb with tannin in 5% hydrochloric acid solution in the presence of ascorbic acid which forms a complex with Ti. 6 ref. (S11, Ti, *Cb*)

394-S. A Spectrographic Method of Determining Scandium in Minerals, Ores, and Process Product. S. M. Solodovnik, A. K. Rusanov and A. I. Kondrashina. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 387-390.
9 ref. (S11c, Sc, RM-n)

395-S. The Spectrographic Determination of Calcium and Zirconium in Bismuth-Uranium Alloys. R. C Smart and M. S. W. Webb. *United Kingdom Atomic Energy Authority,* A.E.R.E. C/R. 2117, Dec. 1957, 8 p.
10 ref. (S11c, Bi, U, Ca, Zr)

396-S.* Nondestructive Testing Applied to Railroad Materials and Equip-

ment. A. S. Pedrick. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 21-35.

Magnetic particle inspection, Zyglo fluorescent penetrant inspection, ultrasonic reflectoscope inspection and radiography applied to the quality control of materials and inspection of parts. (S13)

397-S.* Nondestructive Testing of Uranium. Gerold H. Tenney. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 36-48.

Uranium ranging in thickness from a few mils up to about 2½ in. has been radiographed successfully, using sources of different energies. Typical exposure charts, respective film-screen combinations, the use of vacuum cassettes and the problem of shielding against object and room scatter. Use of radiation gages to measure the uniformity of mass per unit area and the application of ultrasonics. 8 ref. (S13e; U)

398-S.* Development of Techniques for the Detection of Cracks in Small Cylindrical Specimens by Reluctance Methods. Eugene Roffman. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 49-54.

Three-coil reluctance test method, two magnetic loops passing through a test specimen which induce voltages in the detector coils. If no flaw exists, the reluctance of each magnetic loop is equal, resulting in a minimum signal at the output terminals. Tests on high-carbon heat-treated toolsteel specimens yielded no ambiguous results. (S13h; TS, 9-72)

399-S.* Ultrasonic Inspection of Aircraft Forgings. Alex Barath. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 71-78.

Automatic equipment facilitates inspection of flat stock and regular shapes, while in most cases die forgings, because of geometry and grain flow, can best be inspected using a hand scanner and a hand-operated carriage. (S13g; 4-51)

400-S. An Ultrasonic Technique for Non-Destructive Evaluation of Metal-to-Metal Adhesive Bonds. James S. Arnold. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 79-88.

System loss (sonic energy absorption) can be related to bond quality. The relationship is sufficiently close to permit the use of loss observations as a basis for nondestructive bond evaluation. Apparatus for studying this relationship has been constructed. (S13g, K12, 7-59)

401-S.* Nondestructive Testing of Bonded Metal Sandwich Structures. Richard E. Anderson. Paper from "Symposium on Nondestructive Testing", ASTM STP No. 213, p. 89-99.

Test sandwich panels were 0.004-in. gage foil, 0.25 in. cell diameter aluminum-honeycomb sandwiched between two 0.051 by 10 by 10-in. clad Al facing sheets. Optimum frequency for the ultrasonic examination of metal-honeycomb sandwich specimens was 5 Mc. (S13g; Al, 8-66)

402-S. (French.) **Determination of Aluminum and Titanium in Modified Heat Resistant Refractory 80-20 Nickel-Chromium Alloys.** V. Duriez and J. Barboni. *Revue du Nickel,* v. 24, Jan-Feb-Mar. 1958, p. 11-16.

(S11j; SGA-h, *Ti, Al,* Cr, Ni)

403-S. (Italian.) **Automatic Determination of Chromium, Manganese and Vanadium in Steel by Means of the Coulometer.** A. Liberti and L. Ciavatta. *Metallurgia Italiana,* v. 50, Feb. 1958, p. 50-52.

3 ref. (S11j; ST, *Cr, Mn, V*)

404-S. (Japanese.) **Carbon Determination in Titanium and Titanium Alloys.** Yasumoto Otake. *Light Metals (Tokyo),* v. 8, Mar. 1958, p. 59-69.

11 ref. (S11b; Ti, *C*)

405-S. (Japanese.) **Hydrogen Determination in Titanium and Titanium Alloys.** Yasumoto Otake. *Light Metals (Tokyo),* v. 8, Mar. 1958, p. 70-78.

11 ref. (S11r; Ti, *H*)

406-S. (Russian.) **Colorimetric Determination of Thallium in Ores.** N. T. Voskresenskaya. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 395-398.

7 ref. (S11a; Th, RM-n)

407-S. (Russian.) **Photocolorimetric Determination of Silicon in Copper Alloys.** E. I. Nikitina. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 398-402.

6 ref. (S11a; *Si,* Cu-b)

408-S. (Russian.) **Amperometic Titration of Manganese by Use of Sodium Ferrocyanide.** I. L. Teddorovich and M. K. Abramov. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 406-407.

(S11j; Mn)

409-S. (Russian.) **Spectral Analysis of Copper-Manganese Alloys.** V. D. Kovalenko. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 455-457.

(S11K; Cu-b, Mn-b)

410-S. (Russian.) **Spectral Determination of Magnesium in Pig Iron and**

Graphite. K. I. Ionova and S. A. Genshaft. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 459-460.
4 ref. (S11k; *Mg,* CI-a)

411-S. (Russian.) **International Basis for Standardizing Mechanical Testing of Metals.** L. T. Timoshuk. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 487-488.
(S22, Q-general)

412-S. (Russian.) **Spectroscopic Analysis of Nonferrous Metals.** V. V. Nedler and V. L. Ginzburg. *Zavodskaya Laboratoriya,* v. 24, Apr. 1958, p. 507-508.
(S11k; EG-a38)

413-S.* (Spanish.) **Ultrasonic Energy in Metallurgical Processes.** Jose Ors Martinez. *Instituto del Hierro y del Acero,* v. 11, Jan-Mar. 1958, p. 24-38.
Equipment and methods used in sonic energy generation, and application to detection of defects in iron and steel castings. Devices used with detector equipment permit calculations of elastic characteristics on basis of measurement of speed of propagations of longitudinal and transverse waves in material tested. 25 ref. (S13g, Q21f, 1-74)

414-S. Colorimetric Determination of Tungsten in Scheelite Ores and Mill Products. R. P. Hope. *Australasian Institute of Mining and Metallurgy, Proceedings,* no. 185, Mar. 1958, p. 51-64.
8 ref. (S11a; W, RM-n)

415-S. Gravimetric Determination of Thorium and Its Separation From Uranium, Cerite Earths and Ceric Salts. G. M. Saxena and T. R. Seshadri. *Indian Academy of Sciences, Proceedings,* v. 47A, Apr. 1958, p. 238-243.
22 ref. (S11b; Th, *U, Ce*)

416-S. Phosphate-Hydroxyquinoline Method for Separation and Volumetric Determination of Zirconium. A. V. Vinogradov and V. S. Shpinel. *Soviet Journal of Atomic Energy,* v. 3, 1957, p. 895-900. (Translation by Consultants Bureau, Inc.)
18 ref. (S11j; Zr)

417-S. Nondestructive Testing. *Steel,* v. 142, June 23, 1958, p. 110-112.
Quality measurements with resonance, pulse-reflection ultrasonics, eddy current instruments, radiography, penetrants and magnetic particles. (S13, S14, 1-53)

418-S.* How Statistical Techniques Helped Achieve Better Uniformity in Unalloyed Titanium. Chester R. Smith. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 164-169.
Data were collected and analyzed to establish quantitatively the amount of variation within ingots and from ingot to ingot. Brinell hardness of ingots and mechanical properties of finished products were used as the criteria for uniformity. (S12, Q-general, Q29n; Ti, 5-59)

419-S.* Determination of Gaseous Elements in Titanium. Robert M. Fowler. Paper from "Symposium on Titanium", ASTM STP No. 204, p. 197-208.
Simple, rugged vacuum fusion apparatus for oxygen and hydrogen; variations in technique required to handle different types of samples. Special iron crucibles for powdered samples and examples of their use in the analysis of sponge titanium. 13 ref. (S11r, 1-53; Ti)

420-S. Examination of Uranium-Molybdenum and Uranium-Niobium Alloys for Irradiation Tests. J. R. Murray and F. L. Jagger. Atomic Energy Research Establishment, AERE MM-182, Dec. 1957, 12 p.
Preparation and metallographic examination of ten uranium alloy specimens for irradiation tests. (S19; U-b, Mo-b, Cb-b)

421-S. (Czech.) **Thermogravimetric Analysis on Isolating Structural Constituents of Steels and Alloys and Pyrolytic Curves of Carbides.** Hanus Tuma. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 315-319.
Gravimetric determination of the presence of hydroxide in the isolate; evaluates thermogravimetric curves by example of the temperature range of decomposition and weight changes belonging to individual components of the isolate. 4 ref. (S11b, ST)

422-S. (German.) **A Rapid Method for the Separation of Tantalum From Niobium and of the Mixed Oxides From Zirconia.** B. S. Krishna Rao, D. V. N. Sarma and Bh. S. V. Raghava Rao. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, Mar. 19, 1958, p. 351-353.
Procedure for separation based on the differences in solubility of morin complexes in acetone and alcohol. (S11d; Cb, Zr, Ta)

423-S. Metals Analysis With Thenoyltrifluoroacetone. Fletcher L. Moore. *American Society for Testing Materials, Preprint,* no 100a, 1958, 13 p.
Principle of the liquid-liquid extraction technique involving TTA

and a survey of extraction systems using TTA in metals separations. 26 ref. (S11q)

424-S. Detection of Uncombined Oxygen in Zirconium Metal. Louis Silverman and Wanda Bradshaw. *Analytica Chimica Acta*, v. 18, Mar. 1958, p. 253-258.
7 ref. (S11r; Zr, *O*)

425-S. Determination of Hydrogen in Magnesium by Combustion. Maurice Codell and George Norwitz. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 265-269.
14 ref. (S11r; Mg, *H*)

426-S. The Polarographic Determination of Lead in Tin-Base Alloys. M. Ariel and P. Enoch. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 339-344.
14 ref. (S11m; *Pb*, Sn-b)

427-S. The Polarographic Determination of Indium in Zinc-Base Alloys. Pt. 1. General Introduction. The Application of the Linear Sweep Cathode Ray Polarograph. G. F. Reynolds and H. I. Shalgosky. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 345-349.
11 ref. (S11m; *In*, Zn-b)

428-S. Coulometric Determination of Chromium. Louis Meites. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 364-372.
13 ref. (S11a; Cr)

429-S. The Determination of Aluminum, Nickel, Cobalt, Copper, and Iron in Alnico. Donald H. Wilkins and Louis E. Hibbs. *Analytica Chimica Acta*, v. 18, Apr. 1958, p. 372-375.
8 ref. (S11e; *Al, Ni, Co, Cu, Fe*, SGA-n)

430-S. Spectrochemical Analysis of a Nickel-Base High-Temperature Alloy. P. V. Mohan and T. P. Schreiber. *Applied Spectroscopy*, v. 12, no. 1, 1958, p. 6-7.
A single exposure point-to-plant spectrographic procedure. (S11k; Ni-b, SGA-h)

431-S.* Automatic Control in Steel Strip Manufacture. G. Syke. *British Institution of Radio Engineers, Journal*, v. 18, Feb. 1958, p. 117-124.
Thickness gages on strip rolling mills and their use for automatic screw control, measurement and control of extension on skin-pass or temper mills, and automatic sorting of steel sheet and tin-plate on cut-up lines. (S14, X20c, W23)

432-S. Cold-Reduced Tinplate and Cold-Reduced Blackplate. *British Standards Institution*. B.S. 2920, 1957, 15 p.
(S22; ST, *Sn*, 8-65)

433-S. A Rapid Determination of Nonmetallic Inclusions in Steel by Means of Electrolysis. Jisuke Seki and Saburo Kitahara. *Scientific Research Institute, Journal*, v. 51, Dec. 1957, p. 215-224.
5 ref. (S11f; ST, 9-69)

434-S. The Determination of Plutonium as a Minor Constituent in Alloys With Lead, Tin and Bismuth. K. W. Brooke, D. H. F. Atkins and E. N. Jenkins. *United Kingdom Atomic Energy Authority Research Group*, AERE C/M 336, Dec. 1957, 4 p.
Plutonium determined by counting the alpha sources prepared by evaporating small aliquots of solutions prepared from binary alloys of Pu with Pb, Sn or Bi and of tertiary alloys of Pu and Bi with Pb or Sn. (S11j; *Pu*, Pb, Sn, Bi)

435-S.* The Semi-Quantitative Determination of Traces of Sodium, Potassium and Magnesium in Bismuth and Bismuth-Uranium Alloys. R. J. Webb. *United Kingdom Atomic Energy Authority*, AERE C/R 2116, 1958, 7 p.
The Bi or Bi-U alloy is converted to oxide and excited in the d-c arc under standardized conditions. A medium quartz spectrograph is used for recording the spectra which are evaluated by visual comparison with spectra of synthesized samples containing known concentrations of Na, K and Mg. (S11k; Bi, U, *Na, K, Mg*)

436-S. Analysis of Thorium-Boron and Uranium-Boron Alloys. G. A. Barnett and G. W. C. Milner. *United Kingdom Atomic Energy Authority Research Group* AERE C/R 2307, 1958, 13 p.
11 ref. (S11j; Th-b, *B*, U-b)

437-S. Radiometric Determination of Uranium in Ores. LaMar G. Evans and Carl Rampacek. *U. S. Bureau of Mines, Report of Investigation* 5390, Feb. 1958, 15 p.
Empirical procedure for classifying the state of equilibrium in ores by measuring the radioactivity. Equilibrium method depends upon simultaneous measurement of the beta and gamma radiations given off by an ore. The apparent equivalent U content of the sample then is determined by comparing its beta activity with that of known assayed pitchblende standards in radioactive equilibrium. (S11q, S19; U, RM-n)

438-S. (English.) Determination of Oxygen in Titanium by the Micro Bromination Method. Mitsunao Takahashi, Makoto Kawane and Tetsuo

Mitsui. *Mikrochimica Acta,* no. 5, Jan. 1957, p. 647-657.
18 ref. (S11d; *O,* Ti)

439-S.* (English.) **Spectral-Isotopic Method for the Determination of Hydrogen in Metals.** A. N. Zaidel. *Spectrochimica Acta,* v. 10, Feb. 1958, p. 369-376.
Method using deuterium to compute hydrogen content of various metals. 12 ref. (S11r: *H*)

440-S.* (English.) **Spectrographic Analysis of Ores by Introducing the Powder Into the Arc in a Stream of Air.** A. K. Rusanov and V. G. Khitrov. *Spectrochimica Acta,* v. 10, Feb. 1958, p. 404-418.
New method for the spectrographic analysis of substances in powder form, using an alternating current arc, which is initiated by a high-frequency discharge, gives a significant increase in sensitivity and reproducibility, and reduces the time required for analysis. 9 ref. (S11k; RM-n)

441-S. (German.) **Role of the Chemist in the Production of Metallic Uranium and Thorium.** G. Wirths. *Acta Physica Austriaca,* v. 11, no. 4, Spring 1958, p. 471-481.
15 ref. (S11; U, Th)

442-S. (German.) **Determination of Metallic Impurities in Ultrapure Antimony by the Dithizone Method.** Erich Haberli. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, Feb. 1958, p. 15-20.
8 ref. (S11; 9-51; Sb-a)

443-S. (German.) **Volumetric Analysis of Phosphorus and Arsenic in Unalloyed Steel by the Differential Method With Quinolineammoniummolybdate.** S. Meyer and O. G. Koch. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, Mar. 3, 1958, p. 253-258.
5 ref. (S11j; *P, As,* CN)

444-S. (German.) **Photometric Determination of Aluminum in Alloyed Steels.** Helmut Lilie and Hartmut Rosin. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, Mar. 3, 1958, p. 261-267.
(S11a; *Al,* AY)

445-S. (German.) **Photometric Determination of Titanium by Extraction as Tributylammonium-Titanium-Sulfosalicylate.** Max Ziegler, Oskar Glemser and Adolf Von Baecann. *Fresenius' Zeitschrift für Analytische Chemie,* v. 160, no. 5, 1958, p. 324-332.
9 ref. (S11a; Ti)

446-S. (German.) **Contribution to Trace Analysis. Pt. 1. Analysis of Aluminum and Aluminum Alloys.** O. G. Koch. *Mikrochimica Acta,* no. 1, 1958, p. 92-103.
(S11d; Al)

447-S. (German.) **Are Ex-Electrons Suitable for Nondestructive Testing?** E. Schmid and K. Lintner. *Schweitzer Archiv,* Mar. 1958, p. 79-89.
41 ref. (S13e)

448-S. (German.) **Spectroscopic Analysis of Metals, Alloys and Ores.** W. Nabholz. *Schweiz, Technische Zeitschrift,* no. 21, May 23, 1958, p. 449-455.
(S11k)

449-S. (Russian.) **Checking Steel for Microcracks by Using Graded Samples.** I. V. Samolov. *Stal',* v. 18, Mar. 1958, p. 244-245.
Use of graded samples is of advantage only for stable high-quality steels. For other grades of steel a more efficient method should be substituted. 4 ref. (S13; ST, 9-72)

450-S. (Pamphlet.) **Steel Products Manual. Alloy Steel Sheets and Strip.** Apr. 1958, 37 p. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.
Information for purchasers on tolerances, testing, terminology and manufacture. (S22, Q-general, AY, 4-53, 17-55)

451-S. (Pamphlet.) **Steel Products Manual. Flat Rolled Electrical Steel.** Jan. 1958, 39 p. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.
Information for purchasers on tolerances, testing, terminology and manufacture. (S22, Q-general, ST, *Si,* 4-53, SGA-n, 17-55)

452-S. (Book.) **Symposium on Nondestructive Testing.** 99 p. 1956. American Society for Testing Materials, STP no. 213, 1916 Race St., Philadelphia 3, Pa.
Symposium sponsored by ASTM Committee E-7, Los Angeles, Calif., Sept. 17-18, 1956. Pertinent papers abstracted separately. (S13, S14)

453-S. (Book.) **Standards Manual for Copper and Copper-Base Alloy Mill Products.** 181 p. 1958. Copper & Brass Research Association, 420 Lexington Ave., New York 17, N. Y.
Standards for plates, sheets, strips, rods, bars, wire, pipe, tubes and shapes; tables, glossary. (S22; Cu-b)

454-S.* **New Foundry Testing Methods.** Carol A. Koerner. *American*

Foundrymen's Society, Transactions, v. 65, May 1957, p. 181-187.

Cobalt radiography as a tool for improving gating and as a quality control check. Sonic tester developed to separate good and bad castings by measuring the frequency vibration. Hard and soft castings sorted electronically.
(S13, S18, E-general)

455-S.* (Japanese.) **Quantitative Spectro-Analysis of Solution Method. Pt. 2. Quantitative Analysis of Cr, Fe and Si in Al-Cr Alloys.** Ushioda Toyoji, Yoshimura Osamu and Sada Masahiro. *Light Metals,* no. 30, May 1958, p. 34-37.

New method with carbon electrode which is not affected by its porosity and can be used in practical work. Analytical accuracy for Cr and Fe is satisfactory, but not for Si.
(S11k; Al, *Cr, Fe, Si*)

456-S.* **Radioisotopes and Their Uses in Metallurgy.** F. Scot. *Metal Treatment and Drop Forging,* v. 25, June 1958, p. 227-232.

Applications in thickness measurement, analysis, flaw detection and tracer techniques. 16 ref.
(S-general, 1-59; 14-63)

457-S. Radiographic Standards for Bronze Castings. Bureau of Ships. *U. S. Office of Technical Services,* PB 131854, July 1958. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $25.

Set of standard X-ray radiographic film copies for use in the evaluation of discontinuities which provide bases for comparison with radiographs from actual castings. They represent sections of gunmetal bronze plates (specification MIL-M-16576) cast ¾ in. thick. Discontinuities illustrated are gas porosity, shrinkage, sand inclusions, chaplets and tears. (S13e, S2z; Cu-s, 5-60)

458-S.* (Italian.) **Inspection of Anodic Coatings on Aluminum.** A. Prati. *Alluminio,* v. 27, Apr. 1958, p. 165-172.

Methods and equipment for determining thickness, porosity, resistance to corrosion, light and abrasion, dielectric rigidity and electrical resistance of coatings. 18 ref.
(S13, S14, P15, R-general; Al, 8-73)

459-S.* **Determination of Boron in Carbon and Low-Alloy Steels.** *Iron and Steel Institute, Journal,* v. 189, July 1958, p. 227-232.

Method based on the removal of metal ions from a solution of the sample by a cation-exchange resin and subsequent absorptiometric determination of boron in the eluate by means of dianthrimide. The method gives a high degree of reproducibility and sensitivity. 8 ref.
(S11f; CN-g, AY-b, B)

460-S.* (German.) **Zirconium-Magnesium Alloys.** G. N. Cherry, *Giesserei-Praxis,* v. 76, Apr. 25, 1958, p. 147-149.

Composition, heat treatment, mechanical and physical properties of English standards Elektron RZ5 and Z5Z for sand, and Elektron ZRE1 for sand and injection molding. Purpose of flux is to float out impurities and protect molten metal from oxidation. For casting, temperature from 700 to 780° is suggested. Iron and steel crucibles lined with fire-resistant material and careful cleaning and regular checking advised. Melting and refining process. 11 ref. (S22, E-general; Mg, Zr)

461-S.* **The Determination of Tungsten in Titanium, Zirconium and Their Alloys.** D. F. Wood and R. T. Clark. *Analyst,* v. 83, June 1958, p. 326-334.

To fulfill the need for satisfactory methods for the determination of W over the range 0.002 to about 1% in Ti and its alloys, two absorptiometric procedures have been developed, and subsequently extended to the examination of Zr and its alloys. 7 ref. (S11a; Ti-b, Zr-b, W-a)

462-S.* **Analysis of Bismuth Base Alloys. Pt. 3. Ternary Alloys Containing Uranium and Neodymium or Praseodymium.** G. W. C. Milner and J. W. Edwards. *Analytica Chimica Acta,* v. 18, June 1958, p. 513-519.

Procedures for the analysis of Bi-base alloys containing 0.2-5% U and 0.2-5% Nd or Pr. 16 ref.
(S11j, Bi-a, U-a, Nd, Pr)

463-S.* **The Polarographic Determination of Indium in Zinc-Base Alloys. Pt. 2. The Determination of Indium in Zinc and in Zinc Alloys of Low Aluminum Content.** G. F. Reynolds and H. I. Shalgosky. *Analytica Chimica Acta,* v. 18, June 1958, p. 607-611.

Studies of the application of an 8-hydroxyquinoline extraction and of a zinc oxide "collection" procedure for the separation of trace amounts of In from Zn alloys. 8 ref.
(S11m; Zn-b, In)

464-S.* **Polarographic Determination of Indium in Zinc-Base Alloys. Pt. 3. The Determination of Indium in Zinc and in "Lead-Free" Zinc Alloys.** G. F. Reynolds and H. I.

Shalgosky. *Analytica Chimica Acta,* v. 18, June 1958, p. 612-615.

A method for the polarographic determination of In in Zn alloys, applicable when the Pb concentration is small compared with that of In. 7 ref. (S11m; Zn-b, In)

465-S.* The Polarographic Determination of Aluminum. Pt. 1. General Introduction. Polarography of Solochrome Violet R. S. in the Presence of Aluminum. M. Perkins and G. F. Reynolds. *Analytica Chimica Acta,* v. 18, June 1958, p. 616-624.

The polarography of Al; study of method involving the modification by this element of the polarographic characteristics of a diortho-hydroxy azo dye. Interferences from other elements discussed; means for their removal. 36 ref. (S11m; Al-a)

466-S.* The Polarographic Determination of Aluminum. Pt. 2. The Determination of Microgram Amounts of Aluminum in Beryllium Metal. M. Perkins and G. F. Reynolds. *Analytica Chimica Acta,* v. 18, June 1958, p. 625-631.

The method involves the removal of Al from the bulk of the Be and from certain other elements by extraction with 8-hydroxyquinoline into chloroform. 11 ref. (S11m; Al-a, Be-a)

467-S.* The Polarographic Determination of Copper and Iron and Its Application in the Hydrometallurgy of Copper. R. J. Cathro and A. Walkley. *Australian Journal of Applied Science,* v. 9, June 1958, p. 105-114.

The results agree well with those determined by conventional volumetric and gravimetric procedures but the polarographic methods have the advantage of speed and directness. 10 ref. (S11m; Cu, Fe)

468-S. Analysis Control of Tin Bronze and Gun Metals. Jorma Kinnunen and Bertil Wennerstrand. *Foundry,* v. 86, July 1958, p. 97.

Outlines ethylenediaminetetraacetate (EDTA) titration method for determination of tin. 7 ref. (S11j; Cu-s, Sn)

469-S. Weld Radiography. *Industry and Welding,* v. 31, Mar. 1958, p. 28-45.

Explains radiography and its use in the shop and field for inspection and quality control of welds. Recommended equipment and setting for stationary and portable machines; films for various materials. (S13e, 7-51)

470-S.* Assessment of an Electronic Image-Intensifier for Weld Radiography. R. Halmshaw and C. Hunt. *Welding and Metal Fabrication,* v. 26, July 1958, p. 249-254.

Performance and potential range of application of a Philips image-intensifier tube. Techniques; attainable sensitivities. Comparisons of performance with radiography on film and with enlarged-image fluoroscopy are made with reference to the examination of welds. 9 ref. (S13e, T1j; 7-51)

471-S.* Two Apparatus for the Determination of Gases in Metals. D. L. Guernsey and R. H. Franklin. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 3-14.

Discusses vacuum fusion technique and a specialized apparatus for determination of hydrogen in steel. Apparatus includes a furnace for hot extraction of hydrogen, heated either by induction or by resistance (7), as well as the original induction heated tin fusion furnace. 16 ref. (S11r)

472-S.* The Application of Vacuum Fusion to Gas-Metal Studies. A. L. Beach and W. G. Guldner. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 15-24.

Extension of the vacuum fusion method to the study of Ge, Si, Ta and Mo. Fusion baths have been used to alloy samples. Data on an Fe bath, an Ni bath and a Pt-Fe bath. (S11r)

473-S.* Oxygen Determination Using a Platinum Bath and Capillary Trap. William G. Smiley. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 25-32.

As in vacuum fusion, the sample is fused in a graphite crucible with a flux, but a stream of argon at atmospheric pressure is used in place of high vacuum. Platinum is not an effective flux for the refractory metals such as Ta and W; Pt-Co and Pt-Fe alloys dissolve these metals but give somewhat low results on known samples. The Pt bath

gave a standard deviation of 7 ppm. on 50-mg. Pu samples. Twenty-two elements and numerous alloys have been analyzed. 10 ref. (S11r; O)

474-S.* Bromination-Carbon Reduction Method for the Determination of Oxygen in Metals. Maurice Codell, George Norwitz and Silve Kallmann. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 33-40.

Optimum temperature for the bromination reaction is approximately 900° C. At temperatures considerably less or greater, the reaction is slower. The use of bromine free from organic compounds is desirable. Graphite, platinum or gold boats may be used. The method has been applied to the determination of oxygen in Ti, Zr, Cr, V, steels and other metals. It is not applicable to steel containing oxide inclusions. 5 ref. (S11j; O)

475-S.* Emission Spectrometric Determination of Oxygen in Metals. Velmer A. Fassel, William A. Gordon and Ray W. Tabeling. Paper from "Symposium on Determination of Gases in Metals", American Society for Testing Materials, STP no. 222, p. 41-60.

Methods for the determination of oxygen in steel, titanium, the rare earths and other metals. Procedures are based on the liberation of the oxygen content of the metal into an argon atmosphere. Procedures described determine oxygen with a precision comparable to vacuum fusion or bromination—carbon reduction techniques and have the advantage of greatly reduced time requirements. 38 ref. (S11k; O)

476-S.* Temperature Measurement in Solids. W. H. Giedt. *Product Engineering,* v. 29, July 21, 1958, p. 65-67.

Description of thermistors, resistance elements and thermocouples, including temperature range, output error, cost and size. (S16b, X9)

477-S.* Separation of Niobium and Tantalum With Cupferron. A. K. Majumdar and J. B. Ray Chowdhury. *Analytica Chimica Acta,* v. 19, July 1958, p. 18-22.

Method gives highly satisfactory results when applied to the analysis of Cb in Cb-Mo stainless steel. (S11j; SS, *Cb, Ta*)

478-S.* Activation Analysis of Vanadium in High Alloy Steels Using Manganese as Internal Standard. G. Leliaert, J. Hoste and J. Eeckhaut. *Analytica Chimica Acta,* v. 19, July 1958, p. 100-107.

Method for the determination of V in high-alloy steels by radioactivation analysis. Manganese present in the steel sample is used as an internal standard, thus permitting accurate correction of neutron flux irregularities between sample and reference. (S11q; SS, *V*)

479-S.* Determination of Carbon in Titanium, Zirconium and Their Alloys by Gravimetric and Conductimetric Methods. D. F. Wood and M. Williams. *Metallurgia,* v. 58, July 1958, p. 47-52.

Carbon in Ti and Zr can be satisfactorily determined by a combustion method involving the use of argon to moderate the otherwise vigorous oxidation reaction, provided that suitable fluxes are mixed with the sample. 8 ref. (S11b, S11g; *C,* Ti, Zr)

480-S.* Investigations on Colorimetric Methods of Metallurgical Analysis. Pt. 6. Estimation of Silicon in Cast Iron Using the Duboscq Type of Colorimeter. G. V. L. N. Murty. *Metallurgia,* v. 58, July 1958, p. 52-54.

A simple procedure for the estimation of Si in pig iron which compares very favorably with the standard gravimetric methods, reduces time of analysis to 15 min. 10 ref. (S11a, *Si,* CI)

481-S.* Measuring Scratches Accurately Reduces Rejects. Bobly Siebel and Fred R. Miller. *Tool Engineer,* v. 41, Aug. 1958, p. 55-57.

Optical shadow projection instrument measures depth of scratches accurately to 0.00005 in. Instrument is portable, easily used. (S13d, S16d, 1-53)

482-S. Delayed Back-Up Roll Failure in Cold Rolling Mills. M. M. Krobin and K. V. Shishokina. *Metallovedenie i Obrabotka Metallov,* May 1958, p. 43-48.

Factors which lead to sleeve failure. Since sleeves do not fail suddenly after having been shrunk onto shafts it was possible to observe the effect of continued static stresses. Based on observation that highly plastic, improved steel showed no tendency toward delayed failure, it is desirable to develop such heat treatment that would leave the sleeve with an extremely hard rolling surface and a soft center. Evidently surface hardening is indicated. 7 ref. (S21, Q-general)

483-S. (English.) **Activation Analysis of Manganese in Ferromanganese Alloy Using Radium-Beryllium Neutron Source.** Yuzuru Kusaka. *Chemical Society of Japan, Bulletin,* v. 31, Mar. 1958, p. 216-219.

(S11g; Mn, Fe, AD-n)

484-S. (German.) **Methods of Evaluation and Errors in Quantitative Optical Spectral Analysis.** Hans Diebel. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 275-281.

Comparison between spectrographic and spectrometric methods of analysis showed that optical methods, because of different way of registering line intensity, render more accurate results, particularly for the light alloys. Influence of fluid components upon evaporation and optical diffraction, influence of errors in the optic system and in the electronic system as well as equipment for speeding up the evaluation process. 7 ref. (S11k)

485 S. (German.) **Photometric Determination of Titanium in Steel by Chromotrope, Gallic and Pyrogallolcarbonic Acid.** L. Sommer. *Collection of Czechoslovak Chemical Communications,* v. 22, Dec. 1957, p. 1793-1798.

18 ref. (S11a; ST, *Ti*)

486-S. (German.) **Photocolorimetric Determination of Zirconium by Means of Morin.** H. Tuma and N. Tietz. *Collection of Czechoslovak Chemical Communications,* v. 23, Jan. 1958, p. 142-146.

7 ref. (S11a; Zr)

487-S. (German.) **Polarographic Determination of Impurities in Pure Indium.** Franz A. Pohl and Willy Bonsels. *Fresenius' Zeitschrift für Analytische Chemie,* v. 161, Apr. 1958, p. 109-114.

6 ref. (S11m, 9-51; In-a)

488-S. (German.) **Picolinic Acid and Quinaldinic Acid in the Separation and Volumetric Determination of Palladium.** A. K. Majumdar and J. G. Sen Gupta. *Fresenius' Zeitschrift für Analytische Chemie,* v. 161, Apr. 1958, p. 180-181.

(S11j; Pd)

489-S. (German.) **Picolinic Acid and Quinaldinic Acid in the Separation and Complexemetric Determination of Palladium.** A. K. Majumdar and J. G. Sen Gupta. *Fresenius' Zeitschrift für Analytische Chemie,* v. 161, Apr. 1958, p. 181-183.

14 ref. (S11j; Pd)

490-S. (German.) **Present Status of Sheet Metal Testing by Ultrasonics.** W. Lehfeldt. *Industrie-Anzeiger,* Apr. 25, 1958, p. 481-486.

12 ref. (S13g; 4-53)

491-S. (German.) **Contribution to the Determination of Rhodium in Plating Baths.** S. Dorner and M. Froels. *Metalloberfläche,* v. 12, June 1958, p. 168-169.

Control of the rhodium content of the baths. Various methods of analysis. 8 ref. (S11, L17c; Rh)

492-S. (German.) **Oscillograph Method for Testing Aluminum Oxide Layers.** G. Hahn. *Metalloberfläche,* v. 12, June 1958, p. 170.

With the aid of the oscillograph and without any additional voltage it is possible to detect faults in the anodically produced oxide layer on Al. The method also permits a better determination of properties of the oxide skin than possible with other electrical methods. 7 ref. (S13c, Q29; Al-b, 8-73)

493-S. (German.) **Evaluation of Iron Ores.** Willy Zimmer. *Neue Hütte,* v. 3, Apr. 1958, p. 233-235.

Fe content does not determine exclusively the value of iron ore, and slagforming components are of great importance too. Formula for evaluation of iron ores gives results taking into account the usual components in the ore. (S11; Fe, RM-h)

494-S. (German.) **Nondestructive Testing of Materials by Radio-Isotopes.** E. Schiebold and E. Baker. *Technik,* no. 5, 1958, p. 337-343.

9 ref. (S11e)

495-S. (German.) **Ultrasonic Inspection.** H. Staeger. *Technische Mitteilungen,* Nov. 1957, p. 414-423.

17 ref. (S13g)

496-S. (German.) **Tentative Standard Specification for Nodular Cast Iron.** *VDI-Berichte,* v. 27, 1958, p. 11.

(S22; CI-r)

497-S. (Italian.) **Photometric Determination of Iron in Very Pure Aluminum (Raffinal) and Aluminum Alloys.** G. Matelli and E. Attini. *Alluminio,* v. 27, Mar. 1958, p. 119-121.

14 ref. (S11a; Al, *Fe*)

498-S. (Japanese.) **Determination of Nitrogen in Metals by Combustion.** Masahiko Tsuchiya. *Japan Analyst,* v. 7, Jan. 1958, p. 12-16.

In cases where a complete decomposition of the sample by oxidation is possible, all the nitrides can be determined by the combustion method. The determination is verified

by mass spectrometry with satisfactory results except in the case of chromium nitride. (S11b; N)

499-S. (Japanese.) **Determination of Nitrogen and Carbon in Ferro-Alloys.** Masahiko Tsuchiya. *Japan Analyst,* v. 7, Jan. 1958, p. 17-21.

Determination of nitrogen investigated by changing the conditions of combustion. Quantitative determination of nitrogen in easily combustible samples by using lead oxide. Ferrochrome gives satisfactory results by this method.
(S11j; C, N, *Fe,* AD-n)

500-S. (Japanese.) **Rapid Polarographic Determination of Manganese in Ferromanganese and Manganese Slag.** T. Dono, K. Morinag, T. Nomura and G. Nakagawa. *Japan Analyst,* v. 7, Jan. 1958, p. 25-28.

The pH values, maximum suppressive agents, interfering ions, etc., investigated in the quantitative determination of Mn (III); it was found that Ni, Co, Cu, Zn, Pb in 0.3M pyrophosphate showed no disturbing effect and gave a definite polarographic wave.
(S11m; *Mn,* AD-n, Rm-q)

501-S. (Japanese.) **Rapid Photometric Microdetermination of Iron in Chromium, Manganese and Nickel by the Oxinate Extraction Method.** K. Motojima and H. Hashitani. *Japan Analyst,* v. 7, Jan. 1958, p. 28-33.

Ferric oxinate may be quantitatively extracted from fairly acidic solution (pH≥2.4) by chloroform, and the extract has two absorption maxima at 470 and 580 mu. Small amounts of iron in Cr, Mn and Ni may be determined rapidly and accurately. (S11a; *Fe*)

502-S. (Japanese.) **Determination of Zn in Iron Ores in the Presence of Co.** Yoshimi Umezaki.*Japan Analyst,* v. 7, Jan. 1958, p. 37-42.

The supernant solution produces a well-developed zinc spectral wave which is suitable for the determination. Method is most suitable for Zn in quantities less than 1%.
(S11K; *Zn,* Fe, RM-n)

503-S. (Japanese.) **Photometric Determination of Copper in Tin by the Ethylenediamine Tetra-Acetate Method.** S. Ikeda and H. Nagai. *Japan Analyst,* v. 7, Feb. 1958, p. 76-79.

(S11a; *Cu,* Sn)

504-S. (Japanese.) **Rapid Spectrophotometric Determination of Zirconium in Steel.** Shigeo Wakamatsu. *Japan Analyst,* v. 7, Feb. 1958, p. 84-89.

(S11a; ST, *Zr*)

505-S. New Techniques for Finding "Come and Go" Causes That Affect Quality. E. C. Zuppann. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 88-93.

Data analysis system using a ranking method to pinpoint variables affecting quality.
(S12, E-general)

506-S. Quality Control in a Small Foundry. Jules J. Henry. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 146-150.

Differences in quality control programs of large and small foundries; reasons for the need of quality control; methods of quality control that are more useful for small foundries. Specific examples where statistical quality control can be used in small foundries.
(S12, E-general)

507-S. Quality Control for the Foundry Foreman. Jules J. Henry. *American Foundrymen's Society, Transactions,* v. 65, May 1957, p. 177-180.

Points out need for a quality control program and how the foreman shares the responsibility. Ways that supervision can use statistics to control quality; factors that must be controlled. Examples of specific uses of charts and graphs in foundries and how they can be of use to the foundry foreman.
(S12, E-general)

508-S. Determination of Very Small Amounts of Carbon in Metals. Robert E. Fryxell. *Analytical Chemistry,* v. 30, Feb. 1958, p. 273-275.

Controlling the combustion temperature with a variable transformer significantly improves precision of measurement (conductometric). 7 ref. (S11j; C)

509-S. Determination of Low Concentrations of Hafnium in Reactor-Grade Zirconium Metal and Zirconium Alloys by Neutron Activation. W. D. MacKintosh and R. E. Jervis. *Analytical Chemistry,* v. 30, July 1958, p. 1180-1182.

(S11q; *Hf,* Zr)

510-S. Colorimetric Determination of Molybdenum in the Presence of Tungsten. Dumas A. Otterson and Judson W. Graab. *Analytical Chemistry,* v. 30, July 1958, p. 1282-1284.

(S11a; Mo, W)

511-S. Enhanced Precision in the Quantometric Determination of Phosphorus in Low-Alloyed Steels. Niilo

Lounamaa. *Applied Spectroscopy,* v. 12, no. 2, 1958, p. 53-54.

Phosphorus contents in the range from 0.01 to 0.07% in steels can be determined with a coefficient of 2 to 4%. (S11; ST, *P*)

512-S. **Instrumentation for Iron and Steel.** B. O. Smith. *Instrument Practice Automation and Electronics,* v. 12, June 1958, p. 644-649.

Furnace temperature and pressure control; strip width and thickness control; detection of laminations and pinholes.
(S13, S14, S16, S18; ST)

513-S. **Pyrometry in the Non-Ferrous Foundry. Platinum Thermocouples in the Control of Melting Operations.** *Platinum Metals Review,* v. 2, July 1958, p. 90-91.

(S16a, E-general, X9q, 1-52; EG-a38)

514-S. **Radiography.** William D. Kiehle. *Society for Nondestructive Testing, Journal,* v. 16, July-Aug. 1958, p. 313-318.

Materials, applications and typical examples of use of radiography. (S13e)

515-S. **Sources of Defects Located by Nondestructive Testing.** C. E. Betz. *Society for Nondestructive Testing, Journal,* v. 16, July-Aug. 1958, p. 319-322.

Methods of detecting shrinkage porosity, shrink cracks, cupping, pipes, laminations, bursts, flaking, grinding cracks and fatigue cracks. (S13)

516-S. **Principles of High Energy Radiography.** Stanley E. Stacey. *Society for Nondestructive Testing, Journal,* v. 16, July-Aug. 1958, p. 339-344.

Advantages of high-energy radiography in testing sections of varying thicknesses; reduction of scattered radiation; effect of different film speeds, density levels. (S13e)

517-S. **Rapid Determination of Iron in Slag.** Hermann-Josef. *Archiv für das Eisenhüttenwesen,* v. 27, Dec. 1956, p. 753-760. (Iron and Steel Institute Translation no. 739.)

Previously abstracted from original. See item 81-S, 1957.
(S11p; RM-q; Fe)

518-S. **Comparison of Metal Control for Hairline Cracks in Billets and Finished Products.** Z. M. Kalinina. *Stal',* v. 17, Mar. 1957, p. 261-263. (Iron and Steel Institute Translation no. 878.)

Previously abstracted from original. See item 490-S, 1957.
(S13, 1-10; ST, 4-2, 9-22)

519-S. **Some New Apparatus for the Continuous Nondestructive Control of Metals.** L. Beaujard and V. Husarek. *Metaux-Corrosion Industries,* v. 32, Dec. 1957, p. 459-468. (Iron and Steel Institute Translation no. 959.)

Previously abstracted from original. See item 202-S, 1958.
(S13h, S13g, 1-52)

520-S. **The Testing of Materials and Workpieces for Acceptance.** Rudolf Schinn. *Stahl und Eisen,* v. 77, Nov. 14, 1957, p. 1674-1686. (Iron and Steel Institute Translation no. 960.)

Previously abstracted from original. See item 63-S, 1958.
(S22, S13, ST)

521-S. (French.) **Ultrasonic Testing.** P. Bastien. *Soudage et Techniques Connexes,* v. 12, May-June, 1958, p. 187-188.

Survey of work undertaken in France; studies on reference blocks and the interpretation of the various types of weld defects, inquiry into testing equipment and methods, compilation of a trilingual collection of terms used in ultrasonic testing. (S13g; 7-51)

522-S. (German.) **Determination of Oxide in Sintered Aluminum.** Friedrich Eisenkolb and Klaus Müller. *Chemische Technik,* Jan. 1958, p. 32-33.

9 ref. (S11, H10; Al, O, 6-70)

523-S. (German.) **Determination of Antimony in Copper Alloys.** Eberhard Mohr. *Chemische Technik,* Jan. 1958, p. 34-35.

6 ref. (S11; Cu-b, *Sb*)

524-S. (German.) **Application of Amino Compounds in the Polarography of Inorganic Substances; Determination of Cobalt in Steel and Ores.** J. Dolezal and J. Novak. *Collection of Czechoslovak Chemical Communications,* v. 23, May 1958, p. 866-871.

24 ref. (S11m; *Co,* ST, RM-n)

525-S. (German.) **Determination of Vanadium in Pure Aluminum.** L. Erdey and F. Szabadvary. *Fresenius' Zeitschrift für Analytische Chemie,* v. 159, Jan. 1958, p. 429-434.

6 ref. (S11a; Al-a, *V*)

526-S. (German.) **Present State of Standardization in the Aluminum Industry.** A. P. Liebe. *Industrie-*

Anzeiger, v. 80, June 3, 1958, p. 647-649.

4 ref. (S22; Al, Mg)

527-S. (German.) **Rapid Photometric Determination of Chromium in Copper-Chromium Alloys.** Hugo Wiedmann. *Zeitschrift für Metallkunde*, v. 49, May 1958, p. 248-249.

Technique using electrophotometer. (S11a; Cu, *Cr*)

528-S. (Japanese.) **Application of Ultrasonics to the Metallurgical Industry.** Y. Hori. *Metals*, v. 28, June 1958, p. 452-456.

10 ref. (S13g)

529-S. (Russian.) **Study of Mineral Content of Krivoi Rog Ore Sinters.** E. F. Vegman. *Zavodskaya Laboratoriya*, v. 24, Apr. 1958, p. 444-446.

Investigations by mineralography and radiography. 7 ref. (S11, RM-n)

530-S. (Russian.) **Determination of Zinc and Cadmium by Potentiometric Titration of Calcium Ferro-Cyanide.** P. K. Agasyan. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 532-534.

(S11j; Cd, Zn)

531-S. (Russian.) **Complexometric Determination of Copper.** O. B. Budevskii. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 535-537.

(S11j; Cu)

532-S. (Russian.) **Use of Radiography to Determine Mineral Deposits.** A. S. Ivoilov and D. T. Grebennikova. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 582-585.

4 ref. (S11p; RM-n)

533-S. **Quantitative Determination of Rare Earths in Minerals and Concentrates by Fluorescent X-Ray Method.** R. L. Barinskii. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 613-617.

(S11p; EG-g)

534-S. (Russian.) **Quantitative Fluorescent X-Ray Analysis of Ores and Minerals for U, Th, Pb, Ta, Hf, Nb, Zr, Y and Sr.** K. I. Narbutt and I. D. Bespalova. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 617-619.

(S11p; RM-n)

535-S. (Russian.) **Quantitative Determination of Zirconium in Ores by Fluorescent X-Ray Spectrum.** N. F. Losev and A. N. Glotova. *Zavodskaya Laboratoriya*, v. 24, May 1958, p. 619-621.

4 ref. (S11p; *Zr*, RM-n)

536-S. (Russian.) **Analysis of Pure Metals.** V. A. Kazarenko and G. V. Flyantikova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 663-666.

Determination of admixture of silicon in certain semiconductor metals. 7 ref. (S11; *Si*, EG-j)

537-S. (Russian.) **Comparative Study of Photometric Determination of Gallium.** D. P. Shcherbov and A. I. Ivankova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 667-674.

27 ref. (S11a; Ga)

538-S. (Russian.) **Determination of Titanium Micro Particles in Columbium.** Yu. A. Chernikhov, Sh. G. Melamed and B. M. Dobkina. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 677-679.

5 ref. (S11d; Cb, *Ti*)

539-S. (Russian.) **Spectral Analysis of Steel With Modernized Photometric Device FES-I.** N. V. Buyanov, S. L. Zubkovskii and T. V. Kovalenko. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 703-708.

(S11k, 1-53; ST)

540-S. (Russian.) **Analysis of Certain Alloy Elements With Aid of Photo-Electric Stylometer.** K. A. Sukhenko, K. A. Moiseeva and I. G. Tishin. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 711-712.

Use of stylometer has made possible determination of Al in Ni and Mg alloys as well as high concentration of Cu, Zn and Mg in Al alloys. (S11a; Al, Cu, Ni, Mg, Zn)

541-S. (Russian.) **Photo-Electric Spectral Analysis of Metals Abroad.** L. N. Filimonov and V. O. Khandros. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 712-723.

General review of developments in U. S. A., Britain, France, Italy and Japan. 39 ref. (S11k).

542-S. (Russian.) **Spectral Determination of Metallic Traces.** Sh. I. Peizulaev, A. G. Karabash, L. S. Krauz and F. A. Kostareva. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 723-731.

Chemico-spectral analysis of strontium, chromium and silicon. 14 ref. (S11k; Cr, Si, Sr)

543-S. (Russian.) **Spectral Analysis of Highly Pure Tin Preceded by Enrichment With Halogen Compounds.** D. M. Shwartz and V. V. Portnova. *Zavodskaya Laboratoriya*, v. 24, June 1958, p. 731-734.

7 ref. (S11k; Sn-a)

544-S. (Russian.) **Spectrochemical Determination of Admixtures in High-Purity Metallic Zinc.** R. I. Gutkina.

Zavodskaya Laboratoriya, v. 24, June 1958, p. 734-736.

7 ref. (S11k; Zn-a)

545-S. (Russian.) **Spectral Analysis of Metals by Means of Evaporation.** L. V. Lipis. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 736-745.

General review of literature. Method, particularly effective for pure metals, and originally developed for testing heavy metals with complex spectrum, has been effectively applied to Al, Ca, Be, determination of admixtures in semiconductor metals. Method has sensitivity up to 10^{-6} to 10^{-7}%. 48 ref. (S11k; 11-65)

546-S. (Russian.) **Analysis of Ferrous and Nonferrous Alloys With Spectrograph ISP-51.** A. S. Dem'yanchuk, M. E. Shifman and M. I. Rekitar. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 751-752.

(S11k, 1-52)

547-S. (Russian.) **Photo-Electric Analyzer for Investigation of Aluminum Alloys.** L. S. Feld'man, G. A. Prokhorov and T. A. Bronnikova. *Zavodskaya Laboratoriya,* v. 24, June 1958, p. 776-778.

(S11a, 1-53; Al-b)

548-S. (Spanish.) **Determination of Beryllium.** Reinaldo Vanossi. *Asociacion Quimica Argentina,* v. 45, Dec. 1957, p. 215-226.

20 ref. (S11; Be)

549-S.* (German.) **Method of Testing Electroplated Steel Screws.** H. G. Bobe. *Draht,* v. 9, June 1958, p. 218-219.

Methods for determining coat thickness. Comparison of condensation and dip with drop method. Technique and application of the latter. (S14, T7f; 8-62)

550-S.* (German.) **Interpretation of Defects in Ultrasonic Testing.** H. Krainer and E. Krainer. *Schweisstechnik,* v. 12, Mar. 1958, p. 28-32.

Relationship between defect echo and bottom echo. Experiments on specimens with intentionally produced defects and evaluation of results. Influence of defect size, defect form, distance and orientation on the ratio defect echo/back wall echo. 7 ref. (S13g)

551-S.* (German.) **Electronic Microanalyzer With Sound; Its Application in Metallurgy.** Charles Crussard. *Schweisstechnik,* v. 12, Apr. 1958, p. 43-47.

Spot-analysis by radiospectrograph. Construction of apparatus; results of experiments in determination of Mn; determination of oxides during scale formation; study of phases; examination of iron ores. (S11)

552-S. Emission Spectrographic Determination of Metallic Impurities in Powdered Boron. Seymour Lader. *Applied Spectroscopy,* v. 12, 1958, p. 85-86.

7 ref. (S11k; B)

553-S. A Semi-Quantitative Universal Method of Spectrochemical Analysis. P. V. Mohan and D. L. Fry. *Applied Spectroscopy,* v. 12, 1958, p. 90-95.

Method of spectrochemical analysis designed for determination of all metallic elements in powder samples calibrated for 20 elements. The method uses lithium carbonate as a common matrix. 15 ref. (S11k)

554-S. Spectrographic Porous Cup Technique for the Analysis of Indium Alloys. Harry M. Hvman. *Applied Spectroscopy,* v. 12, 1958, p. 95-97.

3 ref. (S11k; In-b)

555-S. Determination of Impurities in Metallic Chromium. N. V. Ageev, A. I. Ponomarev, B. N. Melentyev and V. A. Trapeznikov. *Journal of Applied Chemistry of the USSR,* v. 30, Mar. 1957, p. 505-509.

Methods for the determination of silicon, iron, titanium, zirconium, aluminum, manganese, nickel, copper, hydrogen and nitrogen. 6 ref. (S11; Cr-b, *Si, Fe, Ti, Zr, Al, Mn, Ni, Cu*)

556-S. Spectrographic Determination of Oxygen in Titanium. R. E. Heffelfinger and W. M. Henry. Battelle Memorial Institute (Office of Assistant Secretary of Defense). *U. S. Office of Technical Services,* PB 121641, Apr. 1958, 24 p. $.75.

(S11k; O, Ti)

557-S. (Russian.) **Mechanization of Quality Control in Steel Production.** N. V. Samotesov. *Metallurg,* v. 3, June 1958, p. 32-34.

(S12, 18-74; ST)

558-S. (Book.) **Symposium on Determination of Gasses in Metals.** 60 p. 1957. American Society for Testing Materials, STP no. 222, 1916 Race St., Philadelphia 3, Pa.

Five papers presented at the 60th Annual Meeting of the ASTM, Atlantic City, N. J. June 18, 1957. Papers are abstracted separately. (S11r)

559-S.* (French.) **Device for Easy Measurement of Air Feed to the Cupola.** Andre Mal. *Fonderie Belge,* v. 28, June 1958, p. 187-189.

Inexpensive mechanism consisting of diaphragm and differential manometer mounted on blower piping; operating formulas. (S18q, W18d)

560-S.* **Fluoroscopy Is Ready for New Jobs.** W. R. Hampe. Digest of talk presented before Society of Nondestructive Testing, Dallas, May 1958. *Metal Progress,* July 1958, p. 130, 132, 134.

Fluoroscopy is particularly successful in locating linear discontinuities—tears or cracks (hot or cold). Shrinkage may be seen readily if it is of the cavity type or of the coarse sponge variety. Micro-shrinkage is difficult to see. Three basic fluoroscopic geometric arrangements are used—conventional, high brightness and high definition. Techniques outlined. (S13e)

561-S.* (French.) **Surface Roughness After Grinding and Polishing.** Abbe Cayere. *Machine Moderne,* v. 52, June 1958, p. 33-37.

Conventional visual and mathematical procedures for evaluating surface roughness were found inadequate for hand ground and polished welded iron pipe joints. New approach is proposed in which roughness is viewed as factor which increases wetted surface. Coefficient of increase of wetted surface, obtained by relating normal length of given area to sum of measurements of saw-tooth profile of machined surface, becomes criterion of comparison with required standard. (S15)

562-S.* (Portuguese.) **Nondestructive Testing With Ultrasonic Techniques. Pt. 1.** L. X. Nepomuceno. *Engenharia, Mineracao e Metalurgia,* v. 27, May 1958, p. 273-277.

Physical aspects of phenomenon of vibration; geometrical acoustics; principles of ultrasonic examination; testing by means of pulsed ultrasonics. (To be continued.) (S13g)

563-S. Research on a Method for Determining Boron in Low-Boron Steels. C. T. Litsey, D. L. Chase and E. J. Center. Battelle Memorial Institute. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131374, June 1957, 16 p. $.50.

Accuracy of about 5-10% at the 50 parts per million boron level. (S11a; AY, B)

564-S. Gravimetric Determination of Bismuth Using Hypophosphorous Acid. Donald R. Bomberger. *Analytical Chemistry,* v. 30, Aug. 1958, p. 1321-1322.

4 ref. (S11b; Bi)

565-S. Determination of Traces of Boron in Nickel. C. L. Luke. *Analytical Chemistry,* v. 30, Aug. 1958, p. 1405-1406.

4 ref. (S11a; Ni, B)

566-S. Photometric Determination of Traces of Boron in Silicon. C. L. Luke and S. S. Flaschen. *Analytical Chemistry,* v. 30, Aug. 1958, p. 1406-1409.

After separation by a hydrothermal refining technique. 7 ref. (S11a; Si, B)

567-S. Determination of Calcium in Wolframite Ore. James E. Mathers, G. Victor Potter and Nelson W. Shearer. *Analytical Chemistry,* v. 30, Aug. 1958, p. 1412-1413.

(S11; RM-n, Ca, W)

568-S. Problems Involved in Analyzing Iron Ore Sinters. J. Alfred Gerger and Samuel H. Klinvex. *Blast Furnace and Steel Plant,* v. 46, July 1958, p. 698-704.

Study of reproducibility of chemical analyses made on blast furnace sinter by various laboratories. Constituents analyzed include total iron, FeO, P, S, Mn, silica, magnesia, C, alumina. 6 ref. (S11; Fe)

569-S. Measuring Width in a Hot Strip Mill. Servo-Driven Optical Device Uses Infra-Red Radiation. *Metallurgia,* v. 57, June 1958, p. 307-308.

(S14d, F23; ST, 4-53)

570-S. The Determination of Tin and Tin-Iron Alloy Weights on Tinplate Using the Kunze-Willey Method. F. Cooke and C. E. A. Shanahan. *Metallurgia,* v. 57, June 1958, p. 321-326.

Coulometric method compares satisfactorily with values obtained using chemical dissolution and weight loss method. (S11m; Sn, Fe)

571-S. Metallurgical Absorptiometry and Spectrophotometry. Pt. 1. E. C. Pigott. *Murex Limited Review,* v. 1, no. 18, 1958, p. 528-540.

Photo-electric absorptiometers; available instruments and their application. 4 ref. (S11a, 1-53)

572-S. Sampling of Molten Steel for Oxygen Determination. William M. Milton. *Royal College of Science and*

Technology, Metallurgical Club, Journal, no. 10, 1957-1958, p. 24-27.

7 ref. (S11r, S12h; ST, *O,* 14-60)

573-S. Potentiometric Micro-Titration of Manganese in Ferrous and Nonferrous Metals and Alloys in Ores, Rocks, and Other Materials. A. S. Slavatinsky. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 503-506. (Translation by Consultants Bureau, Inc.)

11 ref. (S11j; Mn, RM-h, RM-n)

574-S. Photometric Determination of Boron in Steel. I. U. Martynenko and A. M. Bondarenko. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 513-516. (Translation by Consultants Bureau, Inc.)

19 ref. (S11a; ST, B)

575-S. (German.) Czechoslovakian Research on the Isolation of Nonmetallic Inclusions and Carbides in Steels. M. Sicha. *Freiberger Forschungshefte,* B26, 1958, p. 46-61.

Old and new methods with emphasis on electrolytic procedure. 23 ref. (S11; ST, 14-68, 9-69)

576-S. (German.) "Surface Play" of Molten Cast Iron. Gyula Nandori. *Freiberger Forschungshefte,* B25, 1958, p. 70-76.

Estimating the composition (Si and Mn in particular) of molten iron from surface appearance. 12 ref. (S11; CI, *Mn, Si,* 14-60)

577-S. (German.) Some Modern Apparatus for Continuous Material Testing. Louis Beaujard and Vladimir Husarek. *Schweisstechnik,* v. 12, Apr. 1958, p. 39-43.

New ultrasonic and magnetic test methods used on sheets. (S13; 4-53)

578-S. (German.) How to Indicate the Roughness of Surfaces. R. Kretschmer. *Werkstattstechnik und Maschinenbau,* v. 48, June 1958, p. 321-323.

15 ref. (S15)

579-S. Determining C, P and S in Steel. Use of Hilger Fluorite Polychromator. *Iron and Steel,* v. 31, Mar. 1958, p. 101-102.

(S11a; *C, S, P,* ST)

580-S. Thermoelectric Method of Determining Carbon in Steel During Openhearth Heats. P. D. Korzh and A. P. Ershova. *Zavodskaya Laboratoriya,* v. 24, 1958, p. 41-43. (Henry Brutcher, Altadena, Calif., Translation no. 4265.)

Previously abstracted from original. See item 245-S, 1958. (S16j; ST, *C*)

581-S. (German.) Analysis of Residues in Low Carbon Steel Treated With Special Deoxidizing Agents. T. Malkiewicz and J. Foryst. *Freiberger Forschungshefte,* B26, 1958, p. 37-45.

Electrolytic analysis of residues. 12 ref. (S11g; CN)

582-S. (German.) Spectroscopic Analysis of Metals, Alloys and Ores. W. Nabholz. *Schweizerische Technische Zeitschrift,* v. 55, June 19, 1958, p. 509-518.

(S11k)

583-S. (Russian.) Magnetic Inspection of Rails. V. V. Vlasov. *Fizika Metallov i Metallovedenie,* v. 5, no. 5, 1957, p. 442-451.

63 ref. (S13h, T23q)

584-S.* (Chinese.) Detection of Iron in Tungsten-Cobalt Alloys. L. Yu. Chen. *Acta Chimica Sinica,* v. 24, June 1958, p. 205-209.

Fe is separated by paper chromatographic method and extracted with 0.1 *N* HCl, and finally determined by Unican photo-electric colorimeter. (S11a; Co, Fe, W)

585-S.* (German.) Optical Inspection; Present Status and Prerequisites for Automation. H. Schier. *Werkstattstechnik und Maschinenbau,* v. 48, June 1958, p. 315-320.

Photo-electric testing method compared with exposure of pictures in a television studio. The "flying spot" system is suggested as well as the use of several receivers the impulses of which are made visible on one screen. Optical equipment and the electronic system of the testing apparatus. 9 ref. (S13d, 1-53)

586-S.* (Italian.) Defects in Aluminum Alloy Parts Made From Semi-finished Products and Specific Methods of Inspection. Eugenio Hugony. *Ingegneria Meccanica,* v. 7, Apr. 1958, p. 25-33.

Defects may originate in foundry procedures, be caused by overheating in heat treat or hot working operations or by finishing operations. Inspection methods and standards. Case histories of defective parts. (S13)

587-S. Simple Analytical Control for Small Foundries. W. A. Burford. *British Foundryman,* v. 51, June 1958, p. 280-282.

Rapid uncomplicated method for determining Sn, Pb, Zn, Ni and P in Cu alloys. Method based on

use of centrifuge to obtain various precipitates is accurate enough for most foundry purposes.
(S11g; Cu-b, P, Pb, Sn, Zn)

588-S. Key to Quality Gear Production — Measurement Analysis. Harold S. Ashton. *Machine and Tool Blue Book,* v. 53, Sept. 1958, p. 107-117.

(S14b, T7a)

589-S. Measurement of the Level of a Liquid Metal by Means of Gamma Rays. L. K. Tatochenko. Paper from "Problems of Metallography and the Physics of Metals", *U. S. Atomic Energy Commission,* AEC-tr-2924, 1958, p. 463-469. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

A major shortcoming of photoelectric systems is the impossibility in principle of using them to determine the level of a liquid metal covered with a layer of slag of unknown thickness. The appearance of cheap sources of gamma rays has permitted the development of a new method for measuring the level. Apparatus and technique.
(S18; 1-59, 1-53)

590-S. Determination of Iron in Uranium by the Carrier-Distillation Method Using Cobalt as an Internal Standard. John B. Ramsay. *U. S. Atomic Energy Commission, LA-2171,* 1958, 30 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

The use of 250 ppm. of cobalt as an internal standard gave a coefficient of variation of 9% and a bias of plus 6% compared to 14 and +44% respectively, in the absence of Co. 7 ref. (S11c; Fe, *U, Co*)

591-S. The Volumetric Determination of Uranium in the Presence of Molybdenum. W. C. Dietrich and J. M. Schreyer. *U. S. Atomic Energy Commission, Y-1194,* 1958, 9 p. (Available from Office of Technical Services, Washington 25, D. C.)

Method involves a collective determination of Mo and U by a Zn amalgam reduction and dichromate oxidation in a phosphoric-sulphuric acid medium. The dichromate equivalent to U is obtained by applying a correction based on an independent spectrophotometric method for Mo. 4 ref. (S11j; U, *Mo*)

592-S. Spectrographic Determination of Beryllium in a Variable Matrix. E. E. Creitz. *U. S. Bureau of Mines, Report of Investigation 5407,* 1958, 10 p.

(S11k; Be, RM-n)

593-S. (Italian.) **Recent Applications of Polarography to Metallurgical Analysis.** Elena Gagliardo. *Contributi Teorici e Sperimentali di Polarografia,* v. 2, 1956. (Supplement to *Ricerca Scientifica),* p. 309-315; v. 3, 1957, p. 212-218.

10 ref. (S11m)

594-S. (Swedish.) **X-Ray Fluorescense Analysis of Sintered Hard Metals and Carbides for Hard-Metal Production.** Lennart Peterson. *Jernkontorets Annaler,* v. 142, 1958, p. 203-208.

Method wherein sample prepared by dissolving hard metal, hard metal powder or carbides in hydrofluoric nitric acid solution is determined using X-ray fluorescense and lithium fluoride analyzing crystal. Rapid and accurate determination of Ti, Ta, Cb, Zr, Fe and Co. 5 ref. (S11p; Cb, Co, Fe, Ta, Ti, Zr)

595-S. (Russian.) **Determination of the Thickness of Oxide Coatings on Aluminum Alloys.** V. P. Borzov and Ye. V. Il'ina. *Izvestiia Akademii Nauk, Seriia Fizika,* v. 19, no. 2, 1955, p. 207-208.

A method based on the relative intensity of the pairs of lines of a filler (potassium bichromate) and of the base. The porosity of the film was determined from the plot of the intensity of the lines of the filler versus the volume of the pores of the film. (S14d, P10m; Al-b)

596-S. Measurement of Casting Surface Roughness. C. H. Good and C. E. McQuiston. *Foundry Trade Journal,* v. 105, Aug. 14, 1958, p. 191-195.

(S15; 5)

597-S. Unit Finds Hidden Pipe Defects. *Steel,* v. 143, Sept. 1, 1958, p. 62-63.

(S13h; 5-60, 9-67)

598-S. What's Inside the Coil? R. Raymond Davisson. *Steel,* v. 143, Sept. 8, 1958, p. 106, 108, 110.

Quality control of tin plate in coils. (S-general; ST, Sn, 8-65)

599-S. Determination of Thorium in Uranium Ores and Feeds by Solvent Extraction Employing Thenoyltrifluoroacetone. Paul G. Laux and Ernest A. Brown. *U. S. Atomic En-*

ergy Commission, NLCO-742, 1958, 27 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Thorium can be determined in uranium ore concentrates by solvent extraction, using TTA in xylene. Interfering elements are removed by precipitation of the acid-insoluble sulphide and the hydroxide groups. 10 ref. (S11g; U, Th)

600-S. (German.) **Surface Roughness Blocks; Manufacture and Use. Pt. 1.** H. Trumpold. *Fertigungstechnik,* v. 8, July 1958, p. 323-329.

Surface models of plastic made from original surfaces by impression. 10 ref. (S15j)

601-S. (German.) **Design of an Optical Automatic Tester for Ball Bearings.** H. Schier. *Werkstattstechnik und Maschinenbau,* v. 48, July 1958, p. 356-360.

Description of a laboratory built tester with scanning microscope and multiplier. (S13d, 1-53)

602-S. (Spanish.) **Simultaneous Potentiometric Determination of Molybdenum and Tungsten in Alloy Steels.** Ramon Suarez. *Real Sociedad Espanola de Fisica y Quimica, Anales,* v. 54 (B), Apr. 1958, p. 285-290.

9 ref. (S11m; AY, *Mo, W*)

603-S. (Book.) **ASTM Standards on Copper and Copper Alloys B5.** 688 p. Sept. 1957. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $6.25.

Includes basic coppers, nonferrous metals used in the manufacture of Cu alloys, Cu and Cu alloy wrought products, ingots and castings, filler metal. (S22; Cu, 15-68)

604-S. (Book.) **Brittle Failure of Rotor Forgings.** 48 p. 1958. American Society for Testing Materials, Special Technical Publication, STP 231, 1916 Race St., Philadelphia 3, Pa. $2.

Problems associated with nondestructive inspection of rotor forgings. (S13, Q26s, 4-51)

605-S. (Book.) **Steel Piping Materials. A-1.** 460 p. 1958. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $5.

Covers pipe used to convey liquids, vapors and gases at normal and elevated temperatures; still tubes for refinery service; heat exchanger and condenser tubes and boiler and superheater tubes. (S22, W13h, 15-68)

606-S. (Book.) **Iron Castings: Compilation of ASTM Standards.** 168 p. 1958. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.75.

Thirty-two standards relating to pig iron, gray iron castings, cast iron pipe, nodular iron castings, malleable iron castings, welding rods and electrodes and general methods of test. (S22, E-general, W29h; 5-60, Fe, 15-68)

607-S.* (Japanese.) **Testing Tin-Plate.** Yoichi Kitamura. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 3-12.

Thickness of tin-plate is measured by chemical, electrolytic, electromagnetic, beta-ray and X-ray analysis. Pinhole and endurance tests are done chemically. Thin oxide film is measured by electrostripping method. Thickness of oil film is measured by extraction and repeated friction methods. These methods are applicable for both hot dipped tin-plate and electrolytic tinplate. (S13, S14; ST, *Sn,* 8-62, 8-65)

608-S.* (Japanese.) **Testing Galvanized Iron.** Kiyoshi Segawa. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 12-16.

Appearance test is useful. Chemical methods are applied in thickness, uniformity and impurity tests. Endurance is tested by water spray method, exposure method and rust measurement. Stripping test is mechanical. Deformability, tension and hardness are also tested. Stripping test is most important. 4 ref. (S13a, S13b, R-general, 1-54; ST, *Zn,* 8-65)

609-S.* (Japanese.) **Testing Acid-Proof Enamel, Glass Lining and Ceramic Coating.** Kokichi Tanaka. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 16-20.

Standard practice for testing advocated. Testing glass linings and ceramic coatings should include endurance, instantaneous heating and cooling, mechanical strength and pinhole and crack tests. Testing of acid-proof enamel should also include endurance acid resistance tests. (S13a, S13b, S13m; NM-f42, NM-g34)

610-S.* (Japanese.) **Current Physical Methods for Thickness Measurement.**

Mitsuo Sugimoto. *Metal Finishing Society of Japan, Journal,* v. 9, May 1958, p. 26-31.

Magnetic method for thickness measurement of thin films is applicable up to 2000 microns. Magneto-induction method is useful in the same range. High-frequency eddy current method can compensate magnetic method and is applicable for diamagnetic samples. Thermocouples have been applied recently and can measure 0.5 to about 1.5×10^{-3} in. Error is of the order of $\pm$ 5%. 10 ref. (S14, X20c)

611-S.* (English.) **Analysis of Microquantities of Antimony, Tin and Arsenic in Ferrotungsten.** Hidehiro Goto, Yachiyo Kakita and Masahiko Sase. *Tohoku University, Science Reports of the Research Institutes,* v. 10 no. 3, June 1958, p. 207-211.

Procedure for spectrophotometric determination. 5 ref.
(S11k; As, Fe, Sb, Sn, W, AD-n)

612-S.* (English.) **Spectrophotometric Determination of Germanium With Quercetinsulfonic Acid.** Takuji Kanno. *Tohoku University, Science Reports of the Research Institutes,* v. 10, no. 3, June 1958, p. 251-258.

Use of 3, 5, 7, 3′, 4′ pentahydroxyflavon-6′-sulphonic acid (quercetinsulphonic acid) for photometric determination of Ge. 12 ref.
(S11a; Ge)

613-S.* (Czech.) **Determination of Iron in Blast Furnace Iron Ores.** Jan Michal and Jaroslav Zalud. *Hutnické Listy,* v. 13, no. 7, 1958, p. 639-641.

Decomposition of specimen with perchloric and phosphoric acids. Reduction of trivalent Fe to bivalent with Ag reducer and titration with potassium bichromate.
(S11j; Fe, RM-n)

614-S.* (Czech.) **Polarographic Determination of Indium.** D. Weiss. *Hutnické Listy,* v. 13, no. 7, 1958, p. 641-643.

Polarographic method for determination of In in slightly acid chloride environment. Masking and removing interfering influence of V, Cd and other elements. Method has high sensitivity. (S11m; In)

615-S.* (Japanese.) **Sampling of Castings.** Kazuo Yasuda. *Metals,* v. 28, July 1958, p. 495-498.

Anisotropy of castings is caused by gravity, incomplete diffusion in solid phase and speed of cooling. Test pieces, taken from small and rapidly cooled samples, should be from different parts of the sample. Quartering is necessary. Correct sampling is very important in spectroscopic analysis. 14 ref.
(S12h, S11k; 5-60)

616-S. (French.) **Rapid Radiometric Determination of Uranium and Thorium in Complex Ores.** G. Jurain and P. Maillot. *Journal de Physique et le Radium,* v. 19, suppl. to no. 4, Apr. 1958, p. 35A-37A.

Method based on two gamma activity measurements carried out with series of scintillation counters and by fixing two different values of gain of pre-amplifier. Two results are thus obtained and these, associated with results obtained by standardization, allow calculation of percentages of U and Th. This method is applicable only to ore in radioactive equilibrium.
(S11q; U, Th, RM-n)

617-S. (French.) **Determination of Vanadium in Metals (Ferrovanadium, Vanadium Alloys, Etc.) and in Vanadic Acids.** F. Nouyrigat. *Societe Chimique de France, Bulletin,* June 1958, p. 781-785.

It is possible to determine amounts of V to within about 0.1% by conducting entire analysis under control of a potentiometer and suitably modifying apparent potential of $Fe^{2+} \rightleftarrows Fe^{3+}$ system by means of a complexing agent (H_3PO_4, for example). 16 ref.
(S11m; V)

618-S. (German.) **A Newly Developed Method for the Immersed Ultrasonic Transmission Testing of Metal Plates and Its Comparison With the Frequency Modulation Method.** I. Egri. *Acta Technica,* v. 21, no. 3-4, 1958, p. 327-343.

Possible error in new method is smaller, permitting either detection of smaller flaws, or greater inspection speeds. 3 ref. (S13g)

619-S. (German.) **Quantitative Spectrochemical Analysis of Spelter.** O. Werner. *Metall,* v. 12, Aug. 1958, p. 697-707.

23 ref. (S11k; Zn)

620-S. (German.) **Photometric Determination of Tin Content in Zinc and Lead.** E. Eberius. *Metall,* v. 12, Aug. 1958, p. 721-724.

6 ref. (S11a; Pb, *Sn,* Zn)

621-S. (Japanese.) **Chemical Analysis and Instrumental Analysis.** Soichiro

Musha. *Metals,* v. 28, July 1958, p. 481-487.

Methods of qualitative and quantitative analysis. (S11)

622-S. (Japanese.) **Notes on Chemical Analysis.** Sigeo Wakamatsu. *Metals,* v. 28, July 1958, p. 488-490.

General instructions. (S11)

623-S. (Japanese.) **Choice of Analytical Methods.** Susumu Suzaki. *Metals,* v. 28, July 1958, p. 491-494.

(S11)

624-S. (Japanese.) **X-Ray Fluorescence Analysis.** Jun Shibata. *Metals,* v. 28, July 1958, p. 499-503.

6 ref. (S11p)

625-S. (Russian.) **Separation of Uranium, Vanadium and Iron by Paper Chromatography.** Yu. V. Morachevskii, M. N. Gordeeva and T. E. Kruglova. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 790-793.

12 ref. (S11f; Fe, U, V)

626-S. (Russian.) **Use of Ascorbic Acid in Determination of Molybdenum.** A. I. Lazarev and V. I. Lazareva. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 798-800.

Volumetric determination of W, Re and Mo. (S11j; Mo, Re, W)

627-S. (Russian.) **Analysis of Pure Metals. Determination of Cadmium in Columbium and Thallium.** V. A. Nazarenko and G. V. Flyantikova. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 801-802.

Chemical determination of micro admixtures of Cd in Cb and Tl by the dithizon method after preliminary separation of component elements, using a chloroform solution of 1 ml. 0.002%.
(S11j; *Cd,* Cb, Tl)

628-S. (Russian.) **Determination of Rhenium in Molybdenum-Containing Products.** B. N. Ranskii. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 803-804.

(S11; Re, Mo)

629-S. (Russian.) **Volumetric Determination of Thorium by Precipitation of Sodium Benzenesulphonate.** I. P. Alimarin and S. S. Alikberov. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958. p. 804-807.

5 ref. (S11j; Th)

630-S. (Russian.) **Separation of Cobalt and Zinc by Amalgam Method.** G. N. Babkin. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 808-810.

A two-stage amalgam process is used involving filtration through a glass filter under vacuum.
(S11f; Co, Zn)

631-S. (Russian.) **Determination of Intermetallic Phases in Nickel Alloys.** N. M. Popova and A. F. Platonova. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 810-812.

Nickel alloys are dissolved by electrolysis in solution of 10 g. citric acid in 10 g. ammonium sulphate in 1200 ml. water under current of 0.06 amp. per sq. cm. and 18-25°. (S11g; Ni)

632-S. (Russian.) **Determination of Iron, Cobalt and Copper in Nickel.** G. V. Loshkareva. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 813-814.

(S11a; Co, Cu, Fe, Ni-b)

633-S. (Russian.) **New Spectrographic Instruments Used in Testing Metals.** A. Ya. Khashafyan. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 875-880.

Spectrograph with diffraction grid DFC-8; large size spectrograph with diffraction grid DFC-13; spectrograph with direct recording DFC-10 (quantometer type); infra-red double-ray spectrometer IKC-14; photoelectric stylometer FYS-1.
(S11k, 1-53)

634-S. (Russian.) **Role of Graphite Powder in Spectral Analysis and Its Use in Analyzing Highly Pure Antimony.** R. R. Shvangirandze and N. V. Simonova. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 881-883.

4 ref. (S11k; Sb, NM-k36)

635-S. (English.) **Tool-Life Testing by Facing in a Lathe.** V. Solaja. *Wear,* v. 1, June 1958, p. 512-514.

It is concluded from experimental cutting with alloy steels using high speed steel tools that the short method of tool-life testing by facing is a promising approximation to Taylor's equation, but more work is needed to clarify uncertainties. Method not applicable to tests with carbide and ceramic tools. 6 ref. (S21, G17a, T6n; TS)

636-S.* (German.) **Sampling and Determination of Hydrogen Contents in Steel Under Normal Operating Conditions.** Herbert Zitter and Helmut Krainer. *Archiv für das Eisenhüttenwesen,* v. 29, July 1958, p. 401-410.

Apparatus for rapid determination of hydrogen in iron melts. Testing is performed with very low hydrogen loss by means of divided Cu molds or by suction into an evacuated glass tube followed by cooling. The environmental conditions are analyzed and reproducibility criteria are established. 14 ref. (S11r, 1-53; ST, *H*)

637-S. The Chemical Analysis of Ternary Alloys of Plutonium With Molybdenum and Uranium. G. Phillips, J. Woodhead and E. N. Jenkins. *Analytica Chimica Acta,* v. 19, Sept. 1958, p. 229-234.

6 ref. (S11; Pu, *Mo, U*)

638-S. Determination of Copper, Lead, Tin and Antimony by Controlled-Potential Electrolysis. Pt. 1. General Method of Analysis. B. Alfonsi. *Analytica Chimica Acta,* v. 19, Sept. 1958, p. 276-283.

Controlled-potential electrolysis method by which it is possible to deposit Cu, Pb, Sn and Sb from the same solution in successive stages. Behavior of each metal during deposition; best working conditions. Determinations are not affected by moderate amounts of Ni, Zn, Mn, Fe, Al. 8 ref. (S11g; Cu, Pb, Sn, Sb)

639-S. Aluminum Identification Simplified. *Steel,* v. 143, Oct. 6, 1958, p. 76-77.

New series of designations applying to stress-relieved Al mill products. Applies only to the heat-treatable series. (S22, S10; Al)

640-S. (German.) **Preparation and Examination of Chemical Analytical Samples.** Alfred Stetter. *Stahl und Eisen,* v. 78, Aug. 7, 1958, p. 1126-1129.

Principles followed in the preparation of check samples to maintain equal chemical composition and physical properties. (S12h)

641-S. Chemical Analysis of Thorium. C. J. Rodden and M. W. Lerner. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 352-370.

Methods for the determination of the following impurities: Al, C, H, Fe, N, O_2, Si, Zr, B, Cd, rare earths, U, Mg, Cr, Cu, Pb, Mn, Mo, Ni, Ti and Zn. 81 ref. (S11; Th)

642-S. The Spectrographic Analysis of Thorium. Velmer A. Fassel and Edward DeKalb. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 371-390.

Carrier distillation technique; conducting briquet technique; determination of the rare earth metals. 14 ref. (S11k; Th)

643-S.* Steel Castings for Radioactive Service. George Sorkin. *Foundry,* v. 86, Oct. 1958, p. 71-73.

Experience in the purchase and inspection of steel castings for radioactive service is seen in the latest revision in specifications. In addition to requirements for cleaning, heat treatment and resistance to intergranular corrosion, nondestructive testing by radiography, liquid penetrant examination and hydrostatic tests are required. (S12, S13, 2-67; ST, 5-60)

644-S.* (Russian.) **Use of Betatron to Study Metal Defects.** A. E. Byzynov, M. D. Mochalov and I. G. Fakidov. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 986-988.

Use of betatron gamma defectoscope with radiation of sufficient intensity at comparatively short intervals makes it possible to reveal tiny defects in steel 500 mm. thick. 14 ref. (S13e; ST)

645-S.* (Russian.) **Use of Radiography for Measurement of Thickness of Rolled Sheet.** A. M. Bogachev. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1029-1032.

It is recommended that for sheet from 0.03 to 0.5 mm. thick β-rays be used, and from 0.5 to 3 mm. soft γ-rays be used. (S14e; ST, 4-53)

646-S.* Radiographing Fusion Welded Joints in Steel Plate Up to Two Inches. *Canadian Machinery,* v. 69, Aug. 1958, p. 114-116.

Recommended practice of the International Institute of Welding for X-ray and gamma-ray inspection to insure uniform results. Three classes of inspection; image quality indicator devices. (S13e; ST, 7-51)

647-S.* (French.) **Industrial Application of Alpha Radioactivity to the Continuous Determination of Uranium in Solution.** J. D. Le Franc, P. Pottier and G. Roux. *Energie Nucleaire,* v. 2, July-Sept. 1958, p. 195-201.

A method for determination of U in leaching solutions of uranium-bearing ores by measurement of the alpha radioactivity of these so-

lutions make it possible to follow variations of concentration in U during recovery of the metal by means of anion-exchanger resins. Reasons for choice of alpha radiation, etc. Application of method to recovery of U in sulphuric and alkaline solutions; apparatus designed for industrial usage. (S11q, C19s; U)

648-S. Separation of Rhodium and Iridium From Base Metals by Ion Exchange. Alice G. Marks and F. E. Beamish. *Analytical Chemistry*, v. 30, Aug. 22, 1958, p. 1464-1466.

11 ref. (S11f; Ir, Rh)

649-S. Spectrographic Analysis of Silicon-Germanium Alloys. Marvin C. Gardels and Hubert H. Whitaker. *Analytical Chemistry*, v. 30, Aug. 22, 1958, p. 1496-1498.

12 ref. (S11k; Ge, Si)

650-S. Automatic Inspection. D. H. McConnell. *Mechanical Engineering*, v. 80, Oct. 1958, p. 65-67.

Automatic preprocess, in-process, and post-process gaging builds precision and higher production into the modern machine tool. Signals from gages insure quality, effect savings. (S14, G17, 18-74)

651-S. Tube Testing Gains Precision. *Steel*, v. 143, Oct. 13, 1958, p. 104-106.

Republic Steel Corp.'s Farrowtest machine works on the eddy-current principle to locate internal defects in tubing. (S13h; 4-60; ST)

652-S. (English.) **Separation of Rhenium by Coprecipitation and Its Determination in Molybdenite.** Yen Jen-Yin and Tao Tseng-Ning. *Scientia Sinica*, v. 7, July 1958, p. 730-737.

15 ref. (S11f, S11j; Re)

653-S. (German.) **Determination of Oxygen Content of Steel by the Gotta Process.** Erich Stengel. *Archiv für das Eisenhüttenwesen*, v. 29, June 1958, p. 351-352.

Under accurately maintained environmental conditions the results are not quite as reliable as those obtained from vacuum melting but are satisfactory for normal laboratory control purposes. (S11r; ST, *O*)

654-S.* Nondestructive Testing Methods of Quartermaster Items and Aerial Delivery Evaluation. Roderick W. Browne. *Nondestructive Testing*, v. 16, Sept-Oct. 1958, p. 385-396.

The Quartermaster Corps has an unusual position in that quality must be controlled at the time of production, during testing and evaluation, and throughout storage until use. As a quality control and inspection method, nondestructive testing is used as an inspection method before testing, a control method during testing, and an evaluation application following the test. (S13)

655-S.* An Evaluation of the Effectiveness of Penetrants. R. E. Kleint. *Nondestructive Testing*, v. 16, Sept-Oct. 1958, p. 421-429.

Penetrant inspection is a valuable tool for detecting surface defects and is becoming increasingly important with the increased use of nonmagnetic structural materials such as Ti and nonmagnetic stainless steels. Investigations designed to develop a method of evaluating the effectiveness of penetrants, evaluate the effect of variables (such as machining, anodizing and vapor honing) on the effectiveness of penetrants, compare effectiveness of penetrants to other means of detecting surface defects such as etching or chromic acid anodizing of Al alloys. (S13k)

656-S.* Radiography and Autoradiography of Plutonium. Dana E. Elliott and Gerold H. Tenney. *Nondestructive Testing*, v. 16, Sept-Oct. 1958, p. 430-437.

By selecting the right energy of radiation, radiographic inspection can give valuable information about the internal physical condition of plutonium. When familiar with the type of radiation originating in this metal, radiographers can take preventive measures to avoid its damaging influence on the radiographic image. The presence of this radiation can be utilized to study the quality of the coatings surrounding the material. Such study is absolutely necessary to protect the objects under investigation as well as the lives of workers handling this material. (S13e, A7r; Pu)

657-S. (English.) **Separation of Rhenium by Coprecipitation and Its Determination in Molybdenite.** Yen Jen-Yin and Tao Tseng-Ning. *Scientia Sinica*, v. 7, July 1958, p. 730-737.

15 ref. (S11a; Re)

658-S. (French.) **Determination of Phosphorus in Aluminum-Silicon Alloys.** Vsevolod Kuhn. *Fonderie*, June 1958, p. 279-282.

Metal is treated in HCL in hydrogen atmosphere, thus freeing sol-

uble phosphorus in form of gaseous phosphuretted hydrogen, which is collected in a solution of brominated hydrobromic acid. Phosphoric acid thus formed is determined photocolorimetrically, using reduced phosphomolybdate method, currently used in analysis of steels. A large fraction of phosphorus remains in undissolved Si. Latter is treated by nitrohydrofluoric solution; phosphorus remaining in residue after evaporation is determined colorimetrically, as above. 7 ref. (S11a; Al, P, Si)

659-S. (Japanese.) **Rapid Simultaneous Photometric Determination of Aluminum and Iron in Titanium or Vanadium by the Oxinate Extraction Method.** Hiroshi Hashitani and Kenji Motojima. *Japan Analyst,* v. 7, Aug. 1958, p. 478-483.

12 ref. (S11a; *Al, Fe,* Ti, V)

660-S. (Japanese.) **Rapid Absorption Spectro-Photometric Determination of Phosphorous in Steels and Special Steels by the Extraction Method.** Mitsuru Ura. *Japan Analyst,* v. 7, July 1958, p. 420-424.

10 ref. (S11a; ST, *P*)

661-S. (Japanese.) **Direct Polarographic Determination of Lead in Free-Cutting Steel.** Kazuo Ota. *Japan Analyst,* v. 7, July 1958, p. 429-432.

(S11m; ST, *Pb*)

662-S. (Russian.) **Chromatographic Determination of Small Admixtures in Nickel-Based Pure Metals.** V. V. Stepin, V. I. Ponosov and E. V. Silaeva. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 934-938.

Determination of small quantities of bismuth, lead, cobalt, nickel, phosphorus, iron and copper. 12 ref. (S11g; Ni, *Bi, Co, Cu, Fe, P, Pb*)

663-S. (Russian.) **Radiometric Determinatian of Uranium, Thorium and Radium in Ores.** E. I. Zheleznova and D. V. Tokareva. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 959-963.

5 ref. (S11q; U, Ra, Th, RM-n)

664-S. (Russian.) **Radiometric Determination of Calcium in Minerals.** S. I. Krichmar and L. G. Kaistra. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 925-927.

(S11q; Ca, RM-n)

665-S. (Russian.) **Method of Multiple Radioactive Dilution for Determination of Small Admixtures in Metals.** I. E. Zimakov and G. S. Rozhavskii. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 922-925.

Method makes possible determination of admixtures up to size of 10^{-7}%. Applied to determination of Sb in Pb. (S11q; Pb, *Sb*)

666-S. (Russian.) **Spectrophotometric Determination of Columbium in Alloys.** I. P. Kharlamov, P. Ya. Yakovlev and M. I. Lykova. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 928-932.

Alloys contained Si, W, Mo and Ti. Results corresponded with volumetric tests. Reproducible results also good. 7 ref. (S11k; Cb)

667-S. (Russian.) **Determination of Silver in Alloys by Radiometric Titration.** V. I. Plotnikov. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 927-928.

Determination of Ag in Cu and Pb-base alloys using strongly acidic solutions containing up to 10% HNO_3. (S11q; *Ag,* Cu, Pb)

668-S. (Russian.) **Analysis of Pure Metals.** V. A. Nazarenko and G. G. Shitareva. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 932-934.

Determination of admixtures of Co in Bi. Method also applicable for determination of Co in Sb, Ge, and Ti. 4 ref. (S11; Co, Ge, Sb, Ti)

669-S. (Russian.) **Chipless Method for Analyzing Metals and Alloys.** A. G. Loshkarev. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 939-940.

Consists of gravimetric analysis of the basic components followed by computation of percentage of admixtures in alloy by use of a given formula. Determination of weight of components can also be made by potentiometric and amperometric methods. (S11b)

670-S. (Russian.) **Determination of Silicon Content in Surface Layers by Microhardness Method.** Z. G. Ordina. *Zavodskaya Laboratoriya,* v. 24, no. 8, 1958, p. 1015-1016.

Method of studying changes in surface hardness as a result of changes in chemical composition of metal can be applied to many other elements. (S11g, Q29q; Si)

671-S. (Spanish.) **Rapid Determination of Phosphorus in Carbon Steels and Cast Irons by Colorimetry and Photo-Absorptiometry.** Ricardo de la Cierva. *Instituto del Hierro y del Acero,* v. 11, Apr-June 1958, p. 85-90.

Method permits determination of P during production of steel in elec-

tric furnace; also applicable to cast irons; gives results in 7 to 12 min. 19 ref. (S11a, S11g; ST-f, *P*)

672-S.* Production Inspection of Pipe and Tubing by the Immersed Ultrasonic Method. R. B. Oliver, R. W. McClung and J. K. White. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 62-79.

Use of ultrasonic techniques detects extremely small defects in pipe designed for critical applications. Method is rapid, highly reliable. (S13g, 4-60)

673-S.* An Eddy Current Test for Capillary Tubing. W. R. Plant and C. Mannal. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 80-87.

Highly sensitive apparatus for flaw detection, especially radial cracks and longitudinal seams. (S13h, 1-53; 4-60)

674-S.* Two Applications of Eddy Current Instruments to Testing of Zircaloy Core Components. R. A. Betz. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 119-126.

Method detects both flaws which cause in-service failure and those affecting heat transfer properties of the cladding materials. (S13h, T11g; Zr)

675-S.* Use of Penetrants for Inspection of Small Diameter Tubing. R. B. Oliver, G. M. Tolson and A. Taboada. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 127-141.

Surface inspection of Hastelloy, Inconel tubing with fluorescent penetrant is very effective for detecting cracks, laps; less so for broad, shallow defects. (S13k; Ni-b, 4-60)

676-S.* Radiography of Materials Used in the Nuclear Energy Field. J. W. Dutli and D. E. Grimm. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 150-164.

Techniques employed. Details of exposure for plastic, graphite, Be, Zr, Pb, Th, Ta, W alloy, U, Pu and Au. (S13e, T11; Be, Zr, Pb, Th, Ta)

677-S.* Ultrasonic Testing as a Method of Determining Variables in Processing Zircaloy and Hafnium. Edwin W. Fink. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 175-180.

Testing method to detect laps, laminations, cracks and other defects occurring during processing. (S13g, T11; Zr, Hf)

678-S.* Testing of Cylindrical Fuel Elements With the Cyclograph. W. J. McGonnagle. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 214-224.

Use of cyclograph to detect voids and cracks, nonbonded areas and thin spots in the clad of U rods encased in 2S Al cans. (S13h, T11g; U, Al)

679-S.* Nickel Thickness Gage. Louis H. Cook, Jr. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 225-230.

Thickness of Ni foils from 0.001 to 0.0006 in. is determined within ± 10% by measuring reluctance of magnetic circuit. (S14h, X20c; Ni, 4-56)

680-S.* Radiography of Fuel Elements and Fuel Materials Using Cesium-137. Merle L. Rhoten. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 266-272.

Cesium-137 fills energy gap in the range 0.4-0.6 Mev between 14-192 and Co-60 for radiography of heavy elements and fuel components. (S13e, T11g; Cs, 14-63)

681-S.* Measurement of Cladding Thickness on Uranium by Autoradiography. G. E. Bradley, W. J. McGonnagle and P. R. Gonzales. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 294-303.

Use of the natural radioactivity of the core material to measure the cladding thickness of Zr-clad fuel elements. Accuracy of ±0.5 mil at a scanning speed of 4 in. per min. 4 ref. (S14e; U, *Zr*, 8-66)

682-S.* Analysis for Certain Metallic Impurities in Niobium. James F. Reed. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 54-56.

General problems of dissolving samples and separation of con-

stituents. Typical results of determination of Fe, Ti and Zr in commercial Cb. 5 ref. (S11; Cb, 9-51)

683-S.* **The Determination of Nitrogen and Oxygen in Niobium.** William F. Harris. Paper from "Technology of Columbium (Niobium)", John Wiley & Sons, Inc., N. Y., 1958, p. 57-59.

Two methods for determination of nitrogen in Cb. Results obtained by solution distillation and alkali fusion methods were in good agreement. Vacuum fusion technique employing a Pt bath was used for determination of oxygen in Cb. 4 ref. (S11r; Cb, *N, O*)

684-S.* (Japanese.) **Recent Methods for Measurement of Surface Roughness.** K. Yamamoto. *Metals,* v. 28, Oct. 1958, p. 752-757.

Quantitative expressions for roughness are represented by either maximum height, root mean square height deviation, centerline average height, form factor, contact ratio or bearing curve. Measurements are done either mechanically, optically or electrically. (S14)

685-S. **Plating Thickness Indicator Designed.** *Industrial Finishing (London),* v. 10, Sept. 1958, p. 44-45.

(S14c, L17, X20c)

686-S. **How to Conquer Gaging Errors.** C. W. Kennedy. *Iron Age,* v. 182, Oct. 23, 1958, p. 70-72.

(S14h, X20)

687-S. **Roughness Standards Today.** E. Bickel. *Microtecnic,* v. 12, Apr. 1958, p. 41-50.

(S15, S22)

688-S. **X-Ray and Gamma-Ray Units Produce Permanent Records.** *Modern Machine Shop,* v. 31, Nov. 1958, p. 122-125.

Combination of X-ray and gamma-ray permits high-pressure valves and castings to be inspected eight times faster. (S13e, T7b, 5-60)

689-S. **Spectrographic Determination of Calcium, Magnesium, Copper, Aluminum, Iron, Titanium and Boron in Highly Pure Silicon.** R. R. Shvangiradze and T. A. Mozgovaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 725-730. (Translation by Consultants Bureau, Inc.)

5 ref. (S11c; Si, *Ca, Mg, Cu, Al, Fe, Ti, B*)

690-S. **Spectrographic Determination of Gold, Platinum, Palladium and Rhodium in Poor Products (Ores, Slags, and Waste Solutions).** D. M. Livshits and S. E. Kashlinskaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 731-733. (Translation by Consultants Bureau, Inc.)

(S11c; RM-n, RM-q, *Au, Pt, Pd, Rh*)

691-S. **Determination of Oxygen and Hydrogen in Titanium.** Z. M. Turovtseva and R. Sh. Khalitov. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 737-739. (Translation by Consultants Bureau, Inc.)

A vacuum fusion method in which coarse graphite powder is used. 7 ref. (S11g, Ti, *OH*)

692-S. **Conductometric Determination of Aluminum.** G. B. Pasovskaya. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 783-784. (Translation by Consultants Bureau, Inc.)

4 ref. (S11g; Al)

693-S. **Mineralogic Make-Up of Fluxed Sinter From Krivoi-Rog Iron Ores.** E. F. Vegman. *Zavodskaya Laboratoriya,* v. 24, no. 4, 1958, p. 444-446. (Henry Brutcher, Altadena, Calif., Translation no. 4326.)

Previously abstracted from original. See item 529-S, 1958.
(S11; RM-n, Fe)

694-S. (German.) **Thermo-Electric Determination of Silicon in Cast Iron.** Gunther Bierwirth. *Giesserei,* v. 45, Sept. 11, 1958, p. 546-549.

(S11g, X25g; CI, *Si*)

695-S. (German.) **Determination of Hydrogen in Aluminum Castings by the Density Quotient Method.** Philipp Schneider and Wolfgang Buchen. *Giesserei,* v. 45, Sept. 11, 1958, p. 561-565.

14 ref. (S11g; Al, *H,* 5-60)

696-S. (German.) **Industrial Radiography With Radioactive Isotopes.** O. Werner. *Metall,* v. 12, Sept. 1958, p. 799-802.

5 ref. (S13e, 14-63)

697-S. (German.) **Influence of Magnesium in Determination of Zinc in Aluminum.** T. Torok and S. Cseti. *Mikrochimica Acta,* May 19, 1958, p. 538-544.

(S11; *Zn.* Al, *Mg*)

698-S. (Portuguese.) **Identification of Uranium.** Luiz Fernando de Carvalho. *Brasil Departamento Nacional da Producao Mineral, Bulletin,* no. 39, 1957, p. 11-13.

(S11; U)

699-S. (Portuguese.) **Spectrophotometric Determination of Cobalt.** David Goldstein and Aida Espinola. *Brasil Departamento Nacional da Producao Mineral, Bulletin,* no. 39, 1957, p. 19-28.

(S11k; Co)

700-S. Simple Test Identifies Stainless. *Iron Age,* v. 182, Nov. 13, 1958, p. 147.

Nitric acid, hydrochloric acid and sodium bismuthate used to distinguish between 200 and 300 series stainless steels. Test is completed within 1 min., can be performed easily. (S10p; SS)

701-S.* (German.) **Mathematical Statistics in Iron and Steel Mills. Pt. 1. Regression Analysis.** Helmut Knuppel, Arthur Stumpf and Bernhard Wiezorke. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 521-533.

By correlation methods the significant factors can be separated from the insignificant ones and a mathematical model representing the problem under study can be constructed. Calculations can then be reduced to filling in schematics. 4 ref. (S12, D3)

702-S.* (German.) **Ultrasonic Testing of Sheet Metal.** W. Lehfeldt. *Industrieblatt,* v. 58, Oct. 1958, p. 425-433.

Methods presently available for flaw detection in sheet metal of different thickness, in pieces or continuous bands; penetrating wave method. Impulse echo-sound method; characteristics of methods shown; number of sound-heads, kind of waves, indication of flaws, kind of indication, possibilities for automation; advantages and disadvantages. Selection of methods according to requirements of end products: timing and location. 13 ref. (S13q; 4-53)

703-S. Determination of Copper in Titanium, Zirconium and Their Alloys. D. F. Wood and R. T. Clark. *Analyst,* v. 83, Sept. 1958, p. 509-516.

1 ref. (S11; Ti, Zr, *Cu*)

704-S. Photometric Method for Determination of Tungsten in Low-Grade Mine Ore and Mineral-Dressing Products. J. B. Pollock. *Analyst,* v. 83, Sept. 1958, p. 516-522.

7 ref. (S11a; *W*, RM-n)

705-S. Spectrophotometric Determination of Iron in High-Purity Bismuth. J. H. High and P. J. Placito. *Analyst,* v. 83, Sept. 1958, p. 522-525.

6 ref. (S11k; Bi, *Fe*)

706-S. Determination of Uranium, Zirconium, Magnesium and Iron in Bismuth Alloys. K. W. Kirby and R. H. A. Crawley. *Analytica Chimica Acta,* v. 19, Oct. 1958, p. 363-368.

(S11k; Bi, *U, Zr, Mg, Fe*)

707-S. Determination of Copper, Lead, Tin and Antimony by Controlled-Potential Electrolysis. Pt. 2. Application of the Method to the Determination of Cu, Pb, Sn and Sb in Bronzes and Brasses. B. Alfonsi. *Analytical Chimica Acta,* v. 19, Oct. 1958, p. 389-394.

(S11; Cu-n, Cu-s, *Sb, Sn, Pb*)

708-S. Determination of Boron in Aluminum-Uranium Fuel Elements. Kenneth W. Puphal, James A. Merrill, Glenn L. Booman and James E. Rein. *Analytical Chemistry,* v. 30, Oct. 1958, p. 1612-1614.

8 ref. (S11, T11g; Al, *U, B*)

709-S. Volumetric Determination of Thorium in Uranium Alloys. Hobart H. Willard, Arthur W. Mosen and Ross D. Gardner. *Analytical Chemistry,* v. 30, Oct. 1958, p. 1614-1616.

7 ref. (S11j; U, *Th*)

710-S. Simple Analytical Control for Small Foundries. W. A. Burford. *Engineer and Foundryman,* v. 24, Aug. 1958, p. 44-47.

Extremely rapid, simple method of determining percentages of Sn, Pb, Zn, P and Ni in Cu alloys. Accuracy sufficient for specifications. (S11j; Cu-b, *Sn, Pb, Zn, P, Ni*)

711-S. Determination of Cobalt in Iron and Steel. R. C. Rooney. *Metallurgia,* v. 58, Oct. 1958, p. 205-208.

After preliminary separation of Fe and Cu by extraction of their cupferrates into chloroform, residual cupferron is destroyed and the Co extracted into benzene. Other metallic complexes are destroyed, excess reagent removed, and the Co determined spectrophotometrically. 6 ref. (S11k; ST, *Co, Fe*)

712-S. Radiation Damage Resistance of Some Rare Earth Cermets.

W. K. Anderson and D. N. Dunning. *Nuclear Science and Engineering*, v. 4, Sept. 1958, p. 458-466.

Europium oxide and gadolinium oxide stainless steel cermets in ranges of 5 to 30% rare earth oxide have been irradiated in the MTR. 5 ref.
(S10; S19; SS, Eu, Gd, 6-70, 2-67)

713-S. Analysis of Microquantities of Antimony, Tin and Arsenic in Ferrotungsten. Hidehiro Goto, Yachiyo Kakita and Masahiko Sase. *Tohoku University, Science Reports of the Research Institutes*, v. 10, June 1958, p. 207-211.

Spectrophotometric method is proposed.
(S11k; Fe, W, AD-n31, *Sb, Sn, As*)

714-S. Simplified Determination of Microquantity of Carbon in Iron, Steel and Ferro-Alloy. Hidehiro Goto, Toshio Watanabe and Kyohei Suzuki. *Tohoku University, Science Reports of the Research Institutes*, v. 10A, no. 2, 1958, p. 97-102.

(S11; *C*, CI, ST, AD-n31)

715-S. Spectrographic Determination of Magnesium in Bismuth-Uranium Alloys. J. C. Cotterill. *United Kingdom Atomic Energy Authority, AERE C/R 2456*, 1958, 7 p.

Bi alloys are converted to oxide and mixed with a spectrographic buffer containing ferric sulphate. Pellets of this mixture are excited in the d-c. arc using Cu electrodes, and spectra are evaluated by microphotometry using the Fe as internal standard. The effective concentration range is 50-700 ppm.
(S11c; Bi, U, *Mg*)

716-S. Improved Analytical Methods of Separating Lead. G. W. C. Milner, J. W. Edwards and A. Paddon. *United Kingdom Atomic Energy Authority, AERE C/R 2612*, 1958, 6 p.

Ion exchange and solvent extraction methods investigated for the separation of Pb in the analysis of Pb-base materials. 6 ref.
(S11f, C19; Pb)

717-S. Analysis of Sodium Metal and Sodium-Potassium Alloy. *United Kingdom Atomic Energy Authority* IGO-AM/CA-110, 1958, 65 p.

(S11; K, Na)

718-S. Polarography of Europium and Ytterbium. James O. Hibbits, Mary R. Menke and Warren F. Davis. General Electric Co., Atomic Products Div. Aug. 11, 1958. *U. S. Atomic Energy Commission, APEX-405*, 19 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.75.

Investigation carried out with lithium chloride, ammonium chloride and tetramethyl ammonium bromide as supporting electrolytes. Wave characteristics and data for diffusion-current constants were determined. 7 ref. (S11m; Eu, Yb)

719-S. Non-Destructive Determination of U^{235} Content of Rod-Shaped Fuel Elements by Gamma Pulse Spectrometry. W. C. Judd, M. B. Leboeuf. Knolls Atomic Power Laboratory. *U. S. Atomic Energy Commission KAPL-1925*, 30 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Method depends on detection of a relatively penetrating 184-kev. gamma ray which is emitted in U^{235} decay. 7 ref. (S19, T11g; U)

720-S. Employment of Lead Screens to Improve Industrial Radiographic Inspection Methods. C. Grogan, M. G. Keefe and C. A. Penrose. Watervliet Arsenal. *U. S. Office of Technical Services*, PB 131537, Jan. 1957, 55 p.

(S13e; Pb, 17-57)

721-S. Introduction to Eddy Current Methods and Techniques. H. L. Libby. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 13-28.

Basic principles and techniques of eddy current testing. (S13h)

722-S. Survey of Ultrasonic Methods and Techniques. S. A. Wenk. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 29-43.

(S13g)

723-S. Survey of Radiation Techniques. Gerold H. Tenney. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 44-61.

22 ref. (S13e)

724-S. Eddy Current Measurement of Clad Thickness. J. W. Allen, R. A. Nance and R. B. Oliver. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 201-213.

Basic principles of eddy current testing as applied to metal thickness and cladding thickness meas-

urements. Results illustrate capability to measure small cladding thicknesses accurately and reliably. 4 ref. (S14h; 8-66)

725-S. Ultrasonic Transmission Tester for Detection of Unbonded Areas. J. D. Ross and R. W. Leep. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 238-245.

An ultrasonic pulse is transmitted through the object under inspection and the received pulse is checked for abnormal attenuation. The abnormally attenuated pulses can be counted as the object is scanned and the total count is a measure of the area over which the defect extends. (S13g)

726-S. Electrode Potential Method of Bond Testing. W. G. Marburger, J. H. Monaweck and W. J. McGonnagle. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 278-285.

Utilizes principle that the electrical resistivity in the immediate neighborhood of a flaw differs from that in solid metal. Specially designed electrodes have made continuous semi-automatic scanning of a specimen possible. (S13c)

727-S. Radiographic Inspection of Nuclear Core Materials and Components. A. E. Oaks. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 304-319.

Utility of different types of radiographic equipment. Exposure data are given for Zr, Hf and U alloys in the range of 150 to 1000 kv. Conversion factors relating these alloys to equivalent thicknesses of steel are also given.
(S13e, T11; Zr, Hf, U)

728-S. Techniques for X-Ray Examinations of End-Weld Closures of Cylindrical Fuel Elements. S. S. Sidhu. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 320-327.

(S13e, T11g; U, 7-51)

729-S. Helium Leak Detection Techniques. W. H. Pappin. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 328-338.

A practical, relatively inexpensive, very accurate, and convenient nondestructive test in many fields where leak-tight joints are important. (S18q, T11)

730-S. A Nondestructive Method for Fuel Assaying. S. G. Forbes. Paper from "Symposium on Nondestructive Tests in the Field of Nuclear Energy", ASTM STP no. 223, 1958, p. 375-381.

A nondestructive method of assaying the Materials Testing Reactor fuel assemblies for their U^{235} content before they are loaded into the reactor. (S19, T11g; U)

731-S. Analysis for Plutonium by Controlled Coulometry. F. A. Scott and R. M. Peekema. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/914, 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Method can be applied to the determination of Pu solution concentrations in the range of 0.05 to 50 g. per liter. Electronic equipment, titration cells and procedures are simple and dependable enough for routine application in a control laboratory. (S11m; Pu)

732-S. Spectrographic Determination of Oxygen, Nitrogen and Hydrogen in Metals. V. A. Fassel, W. A. Gordon and R. J. Jasinski. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/917, 1958, 15 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Experimental techniques and equipment for determination of oxygen and nitrogen in steel, oxygen in Ti, Zr, Nb, Y and hydrogen in Ti. 9 ref.
(S11c, S11r; ST, Ti, Cb, Y, *H, O, N*)

733-S. Analysis of Thorium. Charles V. Banks. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/918, 1958, 40 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Chemical methods for the determination of impurities. Gravimetric, titrimetric, polarographic and spectrophotometric determinations. 319 ref. (S11; Th, 9-51)

734-S. X-Ray Spectroscopy of Rare Earth Elements. F. W. Lytle, K. R. Stever and H. H. Heady. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1425, 1958, 11

p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Methods developed for determining rare-earth elements in bastnaesite and euxenite ore fractions and for analyzing high-purity rare-earth oxides. Samples investigated contained all combinations of 14 rare earths plus Y and Th. 10 ref. (S11c; Th, Y, EG-g, RM-n)

735-S. Determination of Small Carbon Contents in Iron by Damping Measurements. W. Wepner. *Archiv für das Eisenhüttenwesen,* v. 27, Jan. 1956, p. 55-59. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB66.)

(S11g; *C,* Fe)

736-S. New Process for Sampling of Killed and Rimming Steel for Determination of Oxygen and Hydrogen. Hermann Schenck. *Archiv für das Eisenhüttenwesen,* v. 28, 1957, p. 123-125. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB41.)

Previously abtsracted from original. See item 366-S, 1957. (S12h, S11r, 1-53; ST, *O, H*)

737-S. Nondestructive Testing of Metals With Electromagnetic Instruments Using Probes. H. Breitfeld. *Metall,* v. 9, no. 1-2, 1955, p. 14-22. (Henry Brutcher, Altadena, Calif., Translation no. 4408.)

Previously abstracted from original. See item 44-S, 1955. (S13c, S14c)

738-S. Behavior of Metallic Heating Elements in Service Life Testing. A. Schulze and D. Bender. *Metallwissen und Technik,* v. 9, no. 1-2, 1955, p. 7-13. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ATS-53G8G.)

Previously abstracted from original. See item 43-S, 1955. (S21; Ni, Cr, Fe, Al)

739-S. Contribution to the Use of Mathematical Statistics in the Steel Industry. K. Orths. *Stahl und Eisen,* v. 78, no. 1, 1958, p. 14-21. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1584.)

Previously abstracted from original. See item 103-S, 1958. (S12; ST)

740-S. (German.) **Observations on the Selective Separation of Iron by Solvent Extraction.** Hermann Specker. *Archiv für das Eisenhüttenwesen,* v. 29, Aug. 1958, p. 467-470.

Separation with Diaethyl-ether, ammonium thiocyanate, lithium chloride and isobutylmethylketone; improvement of selectivity, coefficient of extraction and mixtures. 16 ref. (S11f; Fe)

741-S. (German.) **Direct Determination of Carbon in Pig and Cast Iron.** Heinz Krapp and Karl-Heinz Tytko. *Giesserei,* v. 45, Oct. 9, 1958, p. 639-642.

5 ref. (S11; C, CI-a, CI-b)

742-S. (German.) **Standardization as Applied to Cast Iron, Cast Steel and Malleable Cast Iron.** A. Knickenberg. *Industrie-Anzeiger,* v. 80, Sept. 12, 1958, p. 28-30.

(S22; CI-b, CI-s, ST)

743-S. (German.) **Testing of Materials Plated With Precious Metals.** H. Spengler. *Metall,* v. 12, July 1958, p. 598-603.

Survey of various tests required for precious metal coatings such as nondestructive testing methods, determination of physical, mechanical and chemical properties, metallographic tests and corrosion resistance tests. These methods are demonstrated on plate which is used on jewelry. (S-general, P-general, Q-general; EG-C31, 8-62)

744-S. (German.) **Spectrum Analysis of Metals, Alloys and Ores.** W. Nabholz. *Schweiz. Technische Zeitschrift,* v. 55, June 26, 1958, p. 529-536.

Instruments such as spectroscopes, spectrographs, spectrometers. Methods of quantitative and qualitative evaluation. (S11k)

745-S. (Japanese.) **Determination of Boron in High-Alloy Steel.** Shigeo Wakamatsu. *Japan Analyst,* v. 7, no. 6, 1958, p. 372-376.

(S11a; *B,* ST, SS)

746-S. (Norwegian.) **Fine-Zinc Alloys.** Georg Steinveit. *Teknisk Ukeblad,* v. 105, Aug. 14, 1958, p. 681-687.

Specifications for zincs used for die-casting alloys; composition of alloys used in France, Great Britain, Germany and U. S. Influence of alloying constituents such as Al, Cu and Mg. Impurities and their significance. Mechanical properties of different alloys. Effect of aging and temperature. (To be continued.) 11 ref. (S22, A-general; Zn-b)

747-S. (Polish.) **Amperometric Determination of Cobalt in Steels.** Konrad Szmidt and Jerzy Weber. *Prace Instytutow Mechaniki,* v 6, no. 19, 1957, p. 71-75.

(S11m; ST, *Co*)

748-S. (Rumanian.) **A New Microgravimetric Method for Determination of Thorium.** Th. I. Pirtea and Georgeta Mihail. *Anuarul Universitatei "C. I. Parhon" Seria: Stiinte Naturale,* no. 12, 1956, p. 51-55.

(S11b; Th)

749-S. (Rumanian.) **Polarographic Methods for Determination of the Quantitative Ratio of the Alkali Metals (Na:K) Without Preliminary Chemical Separation.** A. Duca. *Studii si Cercetari de Chimie Academia Republicii Populare Romine,* v. 4, no. 3-4, 1956, p. 131-144.

(S11m; Na, K)

750-S. (Rumanian.) **A New Method for Photometric Determination of Copper.** G. Spacu and J. Scherzer. *Studii si Cercetari de Chimie, Academia Republicii Populare Romine,* v. 4, no. 3-4, 1956, p. 219-225.

(S11a; Cu)

751-S. (Rumanian.) **Determination of Silver by Precipitation in the Form of Elementary Silver.** S. Cosma and I. Ristici. *Studii si Cercetari Stiintifice, Academia Republicii Populare Romine Filiala Cluj. Seria I. Stiinte Matematice, Fizice, Chimice si Tehnice,* v. 6, no. 3-4, 1955, p. 131-135.

(S11j; Ag)

752-S. (Russian.) **Investigation of Ingot Cooling Process.** V. M. Dement'ev and M. M. Kotrovskii. *Stal',* v. 18, Sept. 1958, p. 847-851.

Method was perfected for determining temperature of ingots at various stages of operation after steel leaves the openhearth. Thermocouples and optical pyrometers used. (S16, X9q, X9r; ST, 5-59)

753-S. (Book.) **Electrodeposited Metallic Coatings.** American Society for Testing Materials. Compilation of Standards E-8, 124 p., 1958. $2.25.

Electrodeposited Zn, Cd, Ni, Cr and Pb for steel. Coatings for Cu, Cu-base alloys, Zn and Zn-base alloys. (S22; ST, Su-b, Zn-b, 8-62)

754-S. (Book.) **Rapid Analysis of Nonferrous Metals and Alloys.** George Norwitz. 112 p. 1957. Chemical Publishing Co., 212 5th Ave., New York 10, N. Y. $4.25.

(S11; EG-a38)

755-S. (Book.) **Symposium on Nondestructive Tests in the Field of Nuclear Energy.** 395 p. 1958. American Society for Testing Materials, STP no. 223, 1916 Race St., Philadelphia 3, Pa. $10.

Papers abstracted separately.
(S13, T11)

756-S.* (Japanese.) **Contact Angle of Water Drop on Low Carbon-Steel Surface Finished by Dry Polishing.** Ken'ichi Goto. *Metal Finishing Society of Japan, Journal,* v. 9, July 1958, p. 267-271.

Contact angle of a water drop on steel surfaces finished by dry mechanical polishing was used to determine degree of surface finishing and in the control of variables influencing surface finish. 7 ref.
(S15f; ST)

757-S. Determination of Small Amounts of Lead in Pure Metals and Ferro-Alloys. L. S. Nadezhina and V. P. Razumova. *Journal of Analytical Chemistry of the USSR,* v. 12, 1957, p. 749-753. (Translation by Consultants Bureau, Inc.)

Technique for determination of small amounts of Pb (of the order of 0.01-0.002%) in Cr-Ni steels in metallic Cu, Cr, etc. 4 ref.
(S11m, *Pb*)

758-S. New Approach to the Measurement of Coating Thickness by Fluorescent X-Ray Absorption. Fred A. Achey and Earl J. Serfass. *Electrochemical Society, Journal,* v. 105, Apr. 1958, p. 204-205.

Balanced filters used for isolating the fluorescence from the base metal. 6 ref.
(S14e; Zr-b, Ag-b, *Fe,* 4-56)

759-S. Radioactive Tracer Study of Steel Surface Defects. T. W. Costa. *Journal of Metals,* v. 10, Apr. 1958, p. 285-289.

High-silica slurry used as a coating on hot top linings is a source of nonmetallic inclusions both on the surface and immediately below the surface. (S13e, D9k; ST, 9-69, 1-59)

760-S. Determination of Gases in Steel by Vacuum Fusion Mass Spectrometry. J. F. Martin, J. E. Friedline, L. M. Melnick and G. E. Pallissier. *Metallurgical Society of AIME, Transactions,* v. 212, Aug. 1958, p. 514-519.

9 ref. (S11c, S11r; ST, *O, N*)

761-S. Determination of Hydrogen in Titanium and Its Alloys. T. D. McKinley. *Metallurgical Society of*

AIME, Transactions, v. 212, Aug. 1958, p. 563-571.

Theory and operational characteristics, indicated precision and accuracy of analytical methods based on vacuum extraction, equilibrium pressure and combustion approaches. 27 ref. (S11r, S11g; Ti-b, *H*)

762-S. Low Temperature Resistance Measurements as a Means of Studying Impurity Distributions in Zone Refined Ingots of Metals. J. E. Kunzler and J. H. Wernick. *Metallurgical Society of AIME, Transactions,* v. 212, Dec. 1958, p. 856-860. 10 ref. (S13c, C28k, 1-67; 5-59)

763-S. Use of Radioisotopes in Filler Metal for Nondestructive Inspection. Paul J. Barnes and Gordon L. Locher. *Welding Journal,* v. 37, Dec. 1958, p. 1176-1181.

Nondestructive examination of Al, Fe and Ag alloy welds for uniformity and penetration. (S13e, K9r, 1-59; Ag-b, Al-b, Fe-b)

SECTION T

APPLICATIONS of METALS in EQUIPMENT and INDUSTRY

1-T. Niobium-Uranium Alloys as Container Material for Molten Uranium Eutectic Alloys. G. W. Powell. Nuclear Metals, Inc. *U. S. Atomic Energy Commission,* NMI-1183, Aug. 22, 1957, 20 p.

(T11, 17-57; Cb-U)

2-T. Boron-Aluminum and Boron-Uranium-Aluminum Alloys for Reactor Application. W. C. Thurber, J. A. Milko and R. J. Beaver. Oak Ridge National Laboratory. *U. S. Atomic Energy Commission,* ORNL-2149, Oct. 17, 1957, 23 p.

7 ref. (T11, R4, 17-57; B, Al, U)

3-T. (German.) **Welding Versus Casting.** F. Paschke. *Giesserei-Praxis,* v. 75, Sept. 30, 1957, p. 413-415.

Advantages in quality and cost of castings for machinery and construction parts. (T7, 17-7; 5, 7-51)

4-T. (Norwegian.) **Clad Metal Plate. Manufacturing and Use in Chemical Industry.** Alf Franzén. *Teknisk Ukeblad,* v. 104, Mar. 14, 1957, p. 211-218.

Clad metal plate of stainless steel, nickel and monel is used in chemical industry particularly for construction of pressure vessels. Manufacture according to Colville's methods; types of plate and test methods; applications, welding and finishing; use of clad metal plate in cellulose and other chemical industries. (T29, 17-57; SS, Ni, 8-66)

5-T. (Norwegian.) **Magnesium and Its Industrial Use.** F. Dyngvold. *Teknisk Ukeblad,* v. 104, Apr. 18, 1957, p. 313-314.

Magnesium and its alloys, use in industry, particularly in motor and aircraft manufacturing. (T24, W11q, 17-57; Mg)

6-T. Armco Develops New Steel for Aircraft and Missiles. *Automotive Industries,* v. 117, Sept. 15, 1957, p. 178, 180.

New precipitation hardening stainless (Armco PH 15-7Mo) has high strength at supersonic speeds, can be easily fabricated, then hardened by heat treatment, costs 1/10 as much as high-strength titanium alloys; will be used chiefly for skins and major structural parts. (T24, 17-57; SS)

7-T. Use of Newer Metals in Chemical Processing Materials of Construction. *Chemical Age,* v. 78, Sept. 28, 1957, p. 449-500.

Newer nuclear uses of Zr, Hf, Cb, Ta. (T29, T10, 17-57; Zr, Cb, Ta, Hf)

8-T. Noble Metals in Chemical Engineering — Platinum, Palladium and Silver. *Chemical Age,* v. 78, Sept. 28, 1957, p. 501-502.

(T29, 17-57; Ag, Pd, Pt)

9-T. Mg Chemical and Metallurgical Uses Grow. C. K. Bjork and P. F. George. *Chemical and Engineering News,* v. 35, p. 72-76.

(T general, 17-57; Mg)

10-T. An Appraisal of Ceramic Cutting Tools. R. C. Brewer. *Engineers' Digest,* v. 18, Sept. 1957, p. 381-386, 418.

Components, porosity and grain size requirements of ceramic materials for cutting tools; use of alumina-based materials for practical tools. Wear resistance, tool life, power requirements and tool forces, surface roughness of machined part, types of work that can be performed most successfully by ceramic tools, given proper machining conditions. 7 ref. (T6n, 17-57; SGA-j, 6-70)

11-T. America's "Automatic Factory". *Metalworking Production,* v. 101, Oct. 25, 1957, p. 1907-1915.

Timken's compared to Moscow's bearing plant. (T7d; 1-61, 18-67)

12-T. (German.) **New System for Construction of Vehicles With Aluminium Semifinished Products.** F. W. H. Suppus. *Aluminium,* v. 33, Sept. 1957, p. 579-584.

The "Evimont" assembly system combines sheet and sectional metal in which the structural parts are clamped to each other by screws. The joints withstand considerable sheer stress. (T21e, K13p; Al, 17-57)

13-T. (German.) **Aluminium in a Double-Decker Bus.** P. Krekel. *Aluminium,* v. 33, Sept. 1957, p. 585-588.

(T21d, 17-57; Al)

14-T. (German.) **Insect Resistance of Aluminium and Compound Aluminium-Plastic Foils.** E. Lowig and K. Broockmann. *Aluminium,* v. 33, Oct. 1957, p. 649-654.

Insect-resistant packing of aluminum foil combined with paper or plastic. 5 ref.
(T10g, 17-57; Al, 4-56)

15-T. (German.) **The AC-Line, Automatic Line for the Manufacture of Cans.** A. Klutmann and A. V. Lovell. *Aluminium,* v. 33, Oct. 1957, p. 655-658.

(T29; Al)

16-T. (German.) **European Aerosol Cans of Aluminium.** A. Taranger. *Aluminium,* v. 33, Oct. 1957, p. 659-662.

(T29, 17-57; Al)

17-T. (German.) **New Application for Aluminium in Hard Foil Packaging.** H. D. Arnold. *Aluminium,* v. 33, Oct. 1957, p. 662-664.

Production by drawing or folding of the hard foil; applications in food packaging industry.
(T10g, 17-57; Al, 4-56)

18-T. (German.) **From Wire to Cold Formed Screws of High Tensile Strength.** A. Hancke. *Draht,* v. 8, Aug. 1957, p. 289-291.

Historical survey of the development of screw production during the last 50 years. (T7f, A2)

19-T. (German.) **Brass as Material for Screws.** K. Schimz. *Metall,* v. 11, Sept. 1957, p. 743-746.

Brass must be selected according to whether the screw is produced by cold forming process or by metal removal. Lead in combination with beta solid solution brass is suitable for utilization on automatics. Alpha brass is perferable for cold forming processes, which increase the yield point and the tensile strength but add to the brittleness. Recrystallization annealing brings back the original properties. Annealing temperature depends on the degree of previous cold deformation. 5 ref.
(T5f, G17, G12, 17-57; Cu-n)

20-T. (Polish.) **Transformer Steel Sheet of Permalloy Type.** J. Rusz and W. Babinski. *Hutnik,* v. 24, July-Aug. 1957, p. 302-304.

Survey of products made in the Experimental Research Center of the Nonferrous Metals Institute in Poland.
(T general, 17-57; AY, SGA-r)

21-T. **Stainless Hopper Cars Stand Long Service.** J. Halbig and R. K. Thompson. *Iron Age,* v. 180, Oct. 17, 1957, p. 118-119.

Hopper cars made from Type 410 stainless steel inspected after 20 years of continuous coal hauling.
(T23p, 17-57; SS)

22-T. **Selecting Friction Materials. Pt. 2. Resilient and Metallic Materials. Property Comparison Data.** Elwin J. Salter. *Materials in Design Engineering,* v. 46, Nov. 1957, p. 134-137.

For automotive, industrial and aircraft applications. Covers semimetallic, cerametallic and metallic material.
(T21c, T24c; 17-57; SGA-m, SGA-c)

23-T. **Materials for Gears.** Norman E. Woldman. *Materials in Design Engineering,* v. 46, Nov. 1957, p. 149-164.

Selection factors. Data on steel, gray cast iron, nodular iron, bronzes, metal powder and nonmetallics.
(T7a, 17-57; ST, CI-n, CI-r, Cu-s, Fe, 6)

24-T.* **Present Utilization of Titanium.** *Metal Progress,* v. 72, Nov. 1957, p. 93-96.

Still too costly for common use, titanium and its alloys are finding many military and civilian applications where high material costs can be justified by the advantages obtained. Greater uniformity of properties, variety of alloys available, lower cost and added user experience point to a steady increase in titanium's future acceptance.
(T24, T29, T2, 17-57; Ti)

25-T.* **Alloys for Precious Metal Jewerly.** Ralph H. Atkinson. *Metal Progress,* v. 72, Nov. 1957, p. 107-111.

Although an integral part of the broad field of metalworking, the precious metal jewelry manufacturing industry has developed its own unique materials and processes. De-

scribes the metals most frequently used by that industry.
(T9s, 17-57; Au, Ag, EG-c)

26-T. Tool Steels for the Moulding of Plastics. C. C. Hanson. *Metallurgia*, v. 56, Sept. 1957, p. 109-114.

Compares wear resistance, toughness, depth of hardening, risk of distortion, machinability, strain resistance, hardness of several commonly used die steels for plastics molding. (T6r, W24n; TS-b)

27-T. Automatic Factories. Pt. 2. Peter Trippe. *Metalworking Production*, v. 101, Nov. 8, 1957, p. 1995-2005.

British Timken compared to American and Russian bearing plants. (T7d, 1-11, 18-17)

28-T. History of the Railway Axle. From Faggotted Wrought Iron to Forged Steel. *Metallurgia*, v. 56, Nov. 1957, p. 229-230.

(T23, 17-57; Fe-m, ST)

29-T. Aluminum Use in Cars Goes Up. C. E. Morphew. *SAE Journal*, v. 65, Oct. 1957, p. 62.

(T21, 17-57; Al)

30-T. Trends of Stainless Steel. *Steel*, v. 141, Nov. 4, 1957, p. 107-122.

American producers and forms they make; present application and future uses of stainless in the automotive, aircraft and railroad industries, in home appliances, food processing equipment, hospital equipment, building—industrial, petroleum, textile and chemical industries, in the field of atomic industry and as fasteners. Types of stainless and their composition, fabrication, machining, forging, casting or powder part production.
(T general, 17-57; SS)

31-T. Development and Testing of Cemented Tungsten Carbide Tipped Drill Steels. Pt. 1. Development of Integral Drill Steel. Pt. 2. Testing. *University of Missouri, School of Mines and Metallurgy, 2nd Annual Symposium on Mining Research.* Curt Dahlin. Technical Series, no. 94, 1957, p. 67-92.

Design and dimension of integral drill steels; properties of cemented tungsten carbide; brazing technique, brazing alloys; drill steels and their mechanical properties; Swedish testing of steels under laboratory control conditions but with regular standard production equipment at Swedish and South African Mines by Sandvik Steel Works. 6 ref.
(T6n, 17-57; TS, W, 6-69)

32-T. (German.) **Lubrication and Design of Sleeve Bearings. Pt. 2.** Karl Droste. *Stahl und Eisen*, v. 77, Sept. 1957, p. 1196-1204.

Bearing characteristics, configuration of the sliding space and bearing materials. 23 ref. (T7d, 18-73, 17-51)

33-T. Stainless Steel in Aromatics Production. Richard E. Paret. *American Perfumer*, v. 70, Sept. 1957, p. 56, 58.

Excellent cleanability, great strength, high resistance to attack of acids, chemicals and to corrosion make stainless steel virtually indispensable in manufacture of soaps, perfumes and other fragrance products. (T29, 17-57; SS)

34-T. Niobium as a Nuclear Metal. M. J. Cotter. *Atomics and Nuclear Energy*, v. 8, Sept. 1957, p. 339-342.

Resources, discovery, separation of Cb, preparation of metal, chemistry, prices, metallurgical aspects, importance in nuclear applications, fabrication, compatibility with U. 7 ref. (T11, 17-57, A general; Cb)

35-T. Tough Home-Made Tools From Scrap Steel and Stellite. S. J. Meno. *Canadian Machinery*, v. 68, Sept. 1957, p. 113.

How to make cutters which bridge the gap between carbide and high speed steel. (T6n, 17-57; ST, SS)

36-T. Steel Speeds Supersonic Flight. *Canadian Machinery*, v. 68, Sept. 1957, p. 124-128, 196-202.

17-7 PH, 17-4 PH, and AM-350 steels, their mechanical and physical characteristics and heat treating.
(T24a, 17-57; SS)

37-T. Huge U. S. Senate Annex Roofed With Copper. Lawrence E. Gichner. *Heating and Air Conditioning Contractor*, v. 48, Sept. 1957, p. 58-61.

Twenty-ounce hard Cu was used in one of year's largest Cu roofing jobs. Design and on-job fabrication details. (T26n, 17-57; Cu)

38-T.* Motor Makers Discuss Aircraft Construction. J. L. McCloud. *Metal Progress*, v. 72, Dec. 1957, p. 77-81.

With the advent of strong sheet steels for airplane structures, dimensional tolerances, their machining, bonding and plating introduce new problems. Electrolytic grinding and milling, as well as metallizing in vacuum, are interesting and important innovations.
(T24a, G24, K12, L17, L23, 17-57)

39-T. Reactor Materials. D. O. Luser. *Nucleonics,* v. 15, Sept. 1957, p. 137-139.

Problems of thermal, radiation and corrosion stability of reactor materials. (T11, 17-57)

40-T.* Ceramic-Oxide Cutting Tools. R. M. Gill. *Machinery,* v. 91, Dec. 6, 1957, p. 1341-1346.

Chemical and physical properties of ceramic oxide tools; advantages of ceramic oxide tooling; recommendations for use; typical test results. (T6n, G17, 17-57; 6-70)

41-T.* Mechanical Tubing. Jack C. Merriam. *Materials in Design Engineering,* v. 46, Dec. 1957, p. 127-146.

Types and shapes of mechanical tubing available, working and fabrication and some typical applications. Principal characteristics of the tubing materials: carbon and alloy steels; stainless steels; Cu, Ni, Al, Mg, Ti and specialty alloys. (T7, 17-57; 4-60)

42-T.* Mechanical Springs — Materials, Finishes and Embrittlement. Lester F. Spencer. *Metal Finishing,* v. 55, Dec. 1957, p. 56-60.

Nominal composition of spring materials including carbon and alloy steels, Cu and Ni-base alloys, and precipitation hardening stainless; protective coatings—Cd and Zn plate; salt spray resistance; embrittlement. (To be continued.) (T7c, 17-57; CN, AY, SS, Ni, Cu)

43-T. Automobile Instrumentation. Pt. 2. *Metal Industry,* v. 91, Nov. 8, 1957, p. 395-396.

Use of die castings. (T21c, 17-57; 5-61)

44-T.* Materials and Processes for the Hot Airplane. H. B. Sipple and G. G. Wald. *Steel Processing and Conversion,* v. 43, Dec. 1957, p. 679-685.

Temperature problem associated with aerodynamic heating; definition of the structural problem; comparison of structural materials from point of view of effect of temperature on properties; fabricating and processing problems. (T24, 17-57; SGA-h)

45-T.* Metallic Material Engineering and Manufacturing Aspects of New High-Speed Aircraft. E. A. Simkovich. *Steel Processing and Conversion,* v. 43, Dec. 1957, p. 686-690.

Certain trends are becoming increasingly apparent: Ti alloys (particularly those responsive to heat treatment) plus the new die steels will adequately cover the range of 250-1000° F. in airframes. Other steel sheet alloys, such as AM350, 15-7Mo, 17-7PH, 422 or 422 modified, will also fill specific requirements in this regime. For temperatures above 1000° F. airframes will probably follow engine trends and utilize the superalloys to a great extent. (T24a, 17-57, SGA-h)

46-T. Canadian Landing Gear Uses 260,000 Tensile Steel. G. F. W. McCaffrey. *Canadian Metalworking,* v. 20, Oct. 1957, p.8-12.

Landing gear was machined from modified SAE 4340 steel and heat treated in neutral salt bath followed by oil quenching and double tempering to give tensile strength of 260,000 psi. (T24, G17, J26; AY)

47-T. Galvanized Structural Steel in Gulf Coast Construction. *Industrial and Engineering Chemistry,* v. 49, Dec. 9, 1957, p. 69A-70A.

Celanese's experience at Bishop, Tex., has led to the use of galvanized, rather than painted, steel in its new, low-pressure polyethylene plant. 4 ref. (T26n, 17-57; ST, *Zn,* 8-65)

48-T. Use of Magnesium in Future Aircraft and Missile Structures. John H. Rizley and Robert E. Mihalco. *Light Metal Age,* v. 15, Dec. 1957, p. 24-27.

(T24, 17-57; Mg)

49-T. How Will We Shape the New Materials? Alfred H. Petersen. *Machine and Tool Blue Book,* v. 52, Dec. 1957, p. 113-124.

Problems in replacing Al with high-strength steel and Ti alloys for framework of aircraft. (T24a; Ti, Al, SS)

50-T. Machining Pontiac's New Steering Knuckle. Lewis B. Arscott. *Machinery,* v. 64, Dec. 1957, p. 130-135.

Knuckles are forged from SAE 1345 steel. After inspection, forgings are heated to 1550° F. in a continuous gas-fired furnace, quenched in oil and drawn to produce a Brinell hardness of 241 to 286. (T21c, F22, J26; CN)

51-T. Ford Speeds Output of Needle Bearings. *Machinery,* v. 64, Dec. 1957, p. 136-143.

(T7d; ST)

52-T. How Auto-Lite Produces 1958 Bumpers. Charles Starzman. *Machinery,* v. 64, Dec. 1957, p. 174-179.

Polishing, phosphatizing, pressing, automatic cleaning, Ni and Cr plat-

ing and rinsing of high-tensile steel sheet.
(T21c, L general; ST, SGB-a, *Ni, Cr*)

53-T. New Chevrolet Transmission Plant Now in High Gear. Edgar Altholz. *Machinery,* v. 64, Dec. 1957, p. 180-187.

Die-casting, forging, machining, forming and welding. Die-caster used is largest in automotive industry. (T21c, E13, 1-52, G general, Al)

54-T. Automatic Factories—Britain Has One, Too. Peter Trippe. *Metalworking Production,* v. 101, Nov. 1, 1957, p. 1973-1977.

Layout and operations in British roller bearing plant. (T7d, 18-74)

55-T. Chance Vought Uses More Steel Castings. *Modern Castings,* v. 33, Jan. 1958, p. 26-28.

(T24, 17-57; ST, 5-60)

56-T. Howard Foundry Builds Quality Into Aircraft Castings. Charles F. Maxwell. *Modern Castings,* v. 32, Jan. 1958, p. 32-36.

Al and Mg foundry practice.
(T24, E general, 17-57; Al, Mg)

57-T. Automotive Gray Cast Iron. D. L. Watson. *Canadian Metalworking,* v. 20, Nov. 1957, p. 42-46.

(T21, 17-57, 2-60; CI-r)

58-T. New Alloy for Reactor Control. *Chemical and Engineering News,* v. 36, Jan. 6, 1958, p. 56.

Control rod alloy of Ag, Cd and In that's cheaper than Hf.
(T11j, 17-57; Ag, In, Cd)

59-T. What's Ahead for Aluminum in Autos. H. F. Barr. *Modern Metals,* v. 13, Oct. 1957, p. 31-42.

Use of Al in Chevrolet's automatic transmission case and fuel injection system. Predicts increases in Al use by automobile industry.
(T21, 17-57; Al)

60-T. Ultra-Lightweight Aluminum Foam. *Modern Metals,* v. 13, Oct. 1957, p. 68-70.

Note on production and properties of Al foam. (T10, 17-57; Al)

61-T. (Italian.) **Packing Materials as a Factor in the Preservation of Fresh Fish.** M. Gualtieri. *Alluminio,* v. 26, Nov. 1957, p. 469-571.

At room temperature as well as under refrigeration, common mackeral and horse mackerel were found to keep better longer in Al containers than in wooden. 4 ref.
(T10g, T29p, 17-57, Al)

62-T. (Italian.) **Contribution of Nickel to the Progress of the Chemical Industry.** *Nickel,* no. 70, Oct. 1957, p. 15-19.

Applications of Ni in equipment for production and handling of synthetic resins, pharmaceuticals, insecticides, etc., resistance of Ni to atmospheric attack and to corrosion by water, salts, acids, gases, alkalis.
(T29, R general, 17-57; Ni)

63-T. (Russian.) **Zinc Alloy Guides on Heavy Machine Tools.** Yu. N. Sychev. *Stanki i Instrument,* v. 28, Sept. 1957, p. 39-40.

(T6n, 15-57; Zn)

64.-T.* High-Temperature Loop for Circulating Liquid Metals. R. W. Fisher and G. R. Winders. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 1-6.

A tantalum loop enclosed in outer envelope of Inconel used in connection with electromagnetic pump and heating transformer to study flow rate, corrosion and mass transfer in circulation of an Mg-Th eutectic and a Bi-U alloy at temperatures of 800 to 950° C. and times up to 5000 hr.
(T11p, 17-57, R2a, R6m; Ta, Mg, Th, Bi, U)

65-T. Fiber Metal Commutator Brushes. Cord H. Sump, George A. Forster and Harlan G. Hamre. *Electrical Manufacturing,* v. 60, Dec. 1957, p. 128-129.

Molybdenum fiber brush on silver-plated slip ring assembly overcomes electrical raise problems. Operation at speeds up to 30,000 fpm. shows no rapid wear or overheating.
(T1, H17, 17-57; Ag, Mo)

66-T. Powdered Metal Tool Bodies Boost Machining Efficiency. Horace Frommelt. *Iron Age,* v. 180, Nov. 14, 1957, p. 166-167.

Powdered metal tool bodies dampened vibration, increasing tool life in milling SAE 1020 and SAE 4340 steels. (T6n, G17b; ST, AY, 6-72)

67-T. Aluminium Aerosol Containers in Europe. *Light Metals,* v. 20, Nov. 1957, p. 359-362.

(T10g, 17-57; Al)

68-T. Light Alloys and Road Transport—a Critical Commentary. *Light Metals,* v. 20, Nov. 1957, p. 366-367.

(T21d, T21e, 17-57; Al, Mg)

69-T. Aluminium in Public Lighting. *Light Metals,* v. 20, Dec. 1957, p. 397-403.

Aluminum is replacing other materials in street-lighting equipment in many countries. (T26a, 17-57; Al)

70-T. Making the Massey-Harris Ferguson-35 Tractor. *Machinery,* v. 91, Dec. 13, 1957, p. 1360-1372. (T3n)

71-T. French Developments in Sintered Ceramic Cutting Tools. Leon Gion and Louis Perrin. *Machinery,* v. 91, Dec. 20, 1957, p. 1420-1430.

Manufacture of sintered oxide ceramics and tests on the application and behavior of the material when used for cutting tool tips. Tests included the machining of various grades of steel and cast iron, and gave information on effects of various rates of feed, surface speed and depth of cut. (T6n, G17, 17-57; 6-70)

72-T.* Porous Metal Filter Media Solve Tough Operating Problems. Jules Kovacs. *Materials in Design Engineering,* v. 47, Jan. 1958, p. 126-128.

Filter units are made by sintering metal powders of controlled particle size to obtain the desired porosity and pore size. Metals are selected to meet specific service requirements and include all grades of stainless steel, nickel, Monel, Inconel, Hastelloy, Durimet 20, bronze, NiAg, Au and Ag. (T7, 17-57, H15, 6-71)

73-T. Forum on Enamelling in Architecture. E. Mackasek and T. J. MacArthur. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 413-417.

Vitreous enamel, steel and aluminum panels for curtain walls and other architectural purposes. Problems encountered. (T26n, L27; Al, ST)

74-T. Kaiser Aluminum Deep Drawn Cans for Food Industry. *Modern Industrial Press,* v. 19, Dec. 1957. (T10g, 17-57, G4b; Al)

75-T. Testing Titanium Afloat. *Modern Metals,* v. 13, Jan. 1958, p. 32-40.

Nine types of Ti boat fittings weighing 312 lb. give 43.5% weight saving in luxury cruiser. Aim of Mallory-Sharon test program is to prove Ti's value in rigorous seagoing use. (T22, 17-57; Ti)

76-T. Aluminum: New Process. Latest Can-Making Techniques Seen as Means of Increasing Marketing Potential for Aluminum. *Packaging Parade,* v. 25, Dec. 1957, p. 68-72. (T10g, 17-57; Al)

77-T. Platinum-Cored Thermionic Valves in the Transatlantic Telephone Cable. G. H. Metson. *Platinum Metals Review,* v. 2, Jan. 1958, p. 2-6.

British repeater remarkable for high-slope tubes with platinum cored cathode, which increase traffic handling capacity. (T1b, 17-57; Pt)

78-T.* Development of High-Tensile Aluminium-Bronze Alloys for Marine Propellers in Great Britain and the United States of America. F. Hudson. *Shipbuilder and Marine Engine Builder,* v. 64, Dec. 1957, p. 681-687.

Advantages of high-tensile Al-bronze for propeller source; founding of marine propellers, including melting and molding practice. (T22h, 17-57, E10; Cu-s, Al)

79-T. Tool Steels. Steels for Plastic Molding Applications . Pt. 6. L. F. Spencer. *Steel Processing and Conversion,* v. 43, Oct. 1957, p. 570-575.

Chemical composition, carburizing and tempering treatments, mechanical properties, corrosion resistance of typical toolsteels used for cavity molds or hobbs for plastic molding application. Consideration in selecting steel. 4 ref. (T29s, 17-57; TS)

80-T. Some Producibility Aspects of Advanced Aircraft Structures. Alfred H. Peterson. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 90-93.

Introduction of higher strength alloys needed for future aircraft, machining and weight problems. (T24, G17; SGA-h, SGB-a)

81-T. (French.) Use of Nickel and Nonferrous Nickel Alloys in Naval Construction. L. Arbellot. *Revue du Nickel,* v. 23, Sept. 1957, p. 73-85.

Mechanical properties and resistance to corrosion of Ni, Monel and Cu-Ni alloys. (T22, Q general, R general, 17-57; Ni)

82-T. (German.) Aluminum as a Printing Surface. R. Brammer. *Aluminium,* v. 33, Dec. 1957, p. 794-797. (T9n, 17-57; Al)

83-T. (German.) Aluminum Alloys as Electrode Material. H. Grefkes. *Aluminium,* v. 33, Dec. 1957, p. 802-803.

Extruded electrodes of Al-Mg-Si alloys behave well in upsetting time, life and cost. 7 ref. (T1f, F22j; Al, 17-57)

84-T. Production of Integrally-Stiffened Panels for the Vanguard Airliner. *Machinery (London),* v. 91, Nov. 15, 1957, p. 1124-1136.

Operations at Vickers-Armstrong. (T24a, G general)

85-T. Construction of the Airframe for a Guided Anti-Aircraft Missile. F. B. Stencel. *Machinery (London),* v. 91, Nov. 15, 1957, p. 1137-1140. (From *Aluminium Suisse.*)

(T24e)

86-T. (French.) Electricite de France's Information Center at Avignon. André Chevrier. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1220-1223.

Decorative and structural Al extensively used in modernized building. (T26n, 17-57; Al)

87-T. (Russian.) Development of Toolsteel. Y. A. Geller. *Metallovedenie i Obrabotka Metallov,* Nov. 1957, p. 43-56.

Compares effectiveness of carbon steel, high-Cr steel and high-speed steel in tool performance. (T6n, 17-57; TS)

88-T. Evaluating Ceramic Tools. Pt. 1. D. R. Kibbey and W. T. Morris. *Automatic Machining,* v. 19, Jan. 1958, p. 36-38.

Analysis of variables and multivariable testing method used to determine how various variables affect cutting tool performance. (To be continued.) (T6n, 17-52; 6-70)

89-T.* Ceramic Cutting Tools—a Progress Report. George W. Barnes. *Grits and Grinds,* v. 48, no. 11, p. 3-8.

New La 687 tool material now being field tested shows much promise; appears to be 6 to 8 times better than its predecessor in wear resistance and tool life. (T6n, Q9n, 17-57; 6-70)

90-T. French Development in Sintered Ceramic Cutting Tools. Leon Gion and Louis Perrin. *Machinery,* v. 91, Dec. 20, 1957, p. 1420-1430.

Manufacture of sintered oxide ceramics and tests on the application and behavior of the material when used for cutting tool tips. Tests included the machining of various grades of steel and cast iron, and gave information on effects of various rates of feed, surface speed and depth of cut. (T6n, G17, H10, 6-70)

91-T. Milling Cutters Standardized for Light Metal. *Modern Metals,* v. 13, Nov. 1957, p. 56-58.

Standardized milling cutters designed especially for Al and Mg. (T6n, W25r; Al, Mg)

92-T. What Will Be the Future of Investment Castings in Aircraft and Missiles? A. H. Langenheim. *Precision Metal Molding,* v. 16, Jan. 1958, p. 44-45.

(T24, 17-57; 5-62)

93-T. Application of Precoated Steel Sheets in Industry. F. H. Smith. *Sheet Metal Industries,* v. 34, Dec. 1957, p. 915-923, 928.

Advantages of using electro-zinc precoated sheet steel illustrated for a wide variety of pressed cold formed and assembled parts. (T general, L17, 4-53; ST, *Zn*)

94-T. Automatic Production of Tapered Roller Bearings. *Sheet Metal Industries,* v. 34, Dec. 1957, p. 924-928.

(T7d, 17-57, 18-74)

95-T. Choosing Valve Materials. Joseph R. Driear. *Steel,* v. 141, Dec. 9, 1957, p. 161-162.

(T7b, 17-57; ST)

96-T. Fabricating the Redstone Missile. *Steel,* v. 142, Jan. 20, 1958, p. 66-71.

(T24e, G general, 17-57; Al)

97-T. These Bearings Don't Wear Out. *Steel,* v. 142, Jan. 20, 1958, p. 82-83.

Aluminum-on-steel bearings have an increased fatigue resistance and compressive strength. (T7d, Q28g, Q7a, Q9n, Al, *ST*)

98-T. Recent Progress in Cutting Tool Materials. William E. Montgomery. *Tooling and Production,* v. 23, Feb. 1958, p. 88-92.

Conventional tungsten carbides and new harder carbides such as WF, having a titanium carbide base with Mo as an alloy carbide addition and using Ni as a binder. (T6n, 17-57, 6-69)

99-T.* Materials and Welding for Nuclear Power Fuel Elements. L. M. Wyatt and F. S. Dickinson. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 378-385, 396.

Forms of fuel elements and importance of welding in their manufacture. Tensile properties of canning materials, possible reactions between coolant and uranium, between coolant and can, and proper conditions and procedure for brazing and arc welding Mo, Ta, Zr, V, W, Mg, Al and stainless steels. (T11g, K1, K8, Q general, 17-57; Al, Be, Mg, Mo, Ta, Zr, SS)

100-T. Fabricating Earth Satellites. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 443.

(T24f)

101-T. (German.) **Recent Experiments Concerning the Production of Gears.** H. Rettig. *Das Industrieblatt,* v. 57, Aug. 1957, p. 338-393.

Experiments with noncutting techniques in shaping of gears (and heavy-duty transmissions). Results with hot pressing, cold rolling, punching (gear wheels of sheet metal or heavy plate) and sintering of spur gears.
(T7a, G11, G2j, H general)

102-T. (Russian.) **Cast Crankshafts for Automobile Engines.** D. P. Glukhov. *Liteinoe Proizvodstvo,* July 1957, p. 6-7.

Composition, microstructure and application of cast iron in production of crankshafts. (T21b, 7-57; CI)

103-T. (Pamphlet.) **Thermal Resistance of Airspaces and Fibrous Insulations Bounded by Reflective Surfaces.** H. E. Robinson, L. A. Cosgrove and F. J. Powell. Report 151, Nov. 14, 1957, 22 p. U. S. Government Printing Office, Washington 25, D. C. 20c.

Report on investigation at National Bureau of Standards on insulating values of panels insulated with Al foil membrane and Al foil in combination with fibrous insulations. (T26n, 17-57, 4-56; Al)

104-T. Materials for "Hot" Rocket Parts Must Withstand 1700° F. Plus. R. C. Kopituk. *Aviation Age,* v. 28, Jan. 1958, p. 104-109.

(T2p, 17-57; SGA-h)

105-T. Machining With a "Throw-away" Insert. H. B. Iron. *Design Engineering,* v. 4, Jan. 1958, p. 36-39.

Use of "throw-away" solid carbide insert holders for carbide cutting tools eliminates cutter or tool sharpening operations and reduces costs. (T6n, W25d, 1-52)

106-T. Aluminium Busbars. H. B. Grainger and R. J. Watkins. *Engineering,* v. 184, Dec. 13, 1957, p. 744-748.

Development of new alloy which overcomes mechanical and electrical difficulties in use of Al busbars. (T1b, 17-57; Al)

107-T. Manufacture of Thin-Walled Leaded-Copper Bearings. G. K. Ogale and P. R. Abhyankar. *Indian Institute of Metals, Transactions,* v. 10, 1956-57, p. 187-194.

Process studies; preparation of bearings; performance test. 21 ref. (T7d; Cu, *Pb*)

108-T. Production of Components for Lambretta Motor Scooters. *Machinery,* v. 92, Jan. 10, 1958, p. 60-73. (T10h, G-general, 1-52)

109-T. Vertical Take-Off and Landing. Lawrence J. Hull. *Metal Progress,* v. 73, Feb. 1958, p. 68-71.

Thrust from a powerful jet engine gives vertical take-off; control of direction is by slight changes in the direction of the main exhaust and stability against roll is by jet reaction controls, all electrically interlinked at the pilot's fingertips. (T24, 17-57)

110-T. Steels for the Petroleum Industry. F. A. Kirk. *Petroleum,* v. 21, Jan. 1958, p. 19-25.

Detailed comparison of the corrosion and heat resisting steels specified in Great Britain and the U.S.A. for use in the petroleum industry. (T29n, T28, 17-57; ST, SGA-g, SGA-h)

111-T. Western-Made High-Precision Instrument Bearings. Penn DeRoche. *Western Machinery and Steel World,* v. 49, Jan. 1958, p. 72-76.

(T7d, G general; SS)

112-T. (German.) **Nickel-Molybdenum Alloys in the American Chemical Industry.** G. R. Barrow. *Chemische Rundschau,* v. 10, Dec. 16, 1957, p. 561-564.

(T29, 17-57; Mo, Ni)

113-T. (German.) **Experiences With Steel Framework in the Tunnels of the Iron Mine Friederike.** W. Fritzsche. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 10, Nov. 1957, p. 543-549.

(T28m, 17-57; ST)

114-T. Silver-Indium-Cadmium Alloy Control Rods for Pressurized Water Reactor. E. F. Losco, I. Cohen and R. R. Eggleston. *American Society of Mechanical Engineers,* Paper no. 57-A—230, Dec. 1957, 12 p.

8 ref. (T11j, 17-57; Ag, Cd, In)

115-T. Titanium Fasteners. R. T. Allsop. *Aircraft Production,* v. 20, Jan. 1958, p. 2-8.

(T7f, 17-57; Ti)

116-T. Titanium for Missile Applications: Pt. 1. B. L. Baird and C. W. Handova. *Industry and Welding,* v. 31, Feb. 1958, p. 40-41, 89-90.

(T24e, 17-57; Ti)

117-T. Boron Steel for Control Rods and Thermal Shields. Nicholas Balai. *Nucleonics,* v. 11, Jan. 1958, p. 100-101.

(T11j, 17-57; ST, *B*)

118-T. Metallurgy and the Plastics Industry. *Rubber and Plastics International Journal,* v. 133, Dec. 28, 1957, p. 1020-1024.

Recent developments in metallurgy as they relate to plastics industry; ductile cast iron, cold extruded steel, ductile Ni-Cr cast iron, glass-steel bonded storage tanks and Vinyl coated steel. (T29s, 17-57)

119-T. Will Gears Operate at 600° F? E. E. Shipley. *American Machinist,* v. 102, Feb. 10, 1958, p. 101-103.

Dynamic testing of gear materials and lubricants indicates future success with Nitralloy-N and synthetic or metallic lubricants.
(T7a, 17-57; AY, SGA-h, NM-h)

120-T. Evaluating Ceramic Tools. Pt. 2. D. R. Kibbey and W. T. Morris. *Automatic Machining,* v. 19, Feb. 1958, p. 42-44.
(T6n, 17-52; Al, 6-70)

121-T. What We Need in High Temperature Materials. Pt. 1. A. J. Carah. *Iron Age,* v. 181, Jan. 23, 1958, p. 75-77.

Limitations of Al, Mg, Ti and steel alloys present urgent need for development of alloy-lean, heat resistant steels for aircraft and missile production. (T24, 2-62, 17-57; SGA-h, Al, Mg, Ti, AY)

122-T. High Strength Cast Alloys Used for Low Cost Jet Fighter Parts. *Western Metalworking,* v. 16, Jan. 1958, p. 63.

Aluminum castings for fuel tank pylons and canopy breakers are stronger, lighter and less expensive than parts machined from bar stock. (T24, 17-57; Al, 5-60)

123-T. Development of Electric Cable Manufacture. C. G. Gorton. *Wire Industry,* v. 25, Jan. 1958, p. 67-68.
(T1b, 17-57; Al, NM-d)

124-T. (French.) **Strength of Monobloc Tanks.** R. Epain. *Metallurgie et la Construction Mecanique,* v. 90, Jan. 1958, p. 15-23.

Calculations for construction of banded monobloc tanks for high-pressure service. Stresses, equilibrium equations, elastic strength, banding and banding with wire in monobloc vessel. (To be continued.) (T26q)

125-T. (Hungarian.) **New Hard Lead Alloys for Battery Grids.** Laszlo Pesthy. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 53-57.

Hard lead is an alloy of Pb and Sb. Antimony may be replaced by Pb-Ca alloys, Cd, Te and Li. 4 ref. (T1, 17-57; Pb, *Ca, Cd, Li, Te*)

126-T. (Russian.) **Hard Metal Spiral Tools.** N. A. Rozno. *Stanki i Instrument,* v. 28, Nov. 1957, p. 29-32.

Tools for working corrosion resistant and tempered steels and alloys of unusual toughness and strength. (T6n, G17; SGA-g, ST)

127-T. Materials for Superheater Tubes and Supports. D. W. Crancher. *Institute of Marine Engineers,* Advance Copy, Jan. 14, 1958, p. 1-18.

Qualities of six tube steels developed for use for superheater tubes and supports for boilers. Creep and corrosion resistance, mechanical strength, use of welding, availability. 41 ref.
(T22h, W11k, 4-60, R2g, Q3; ST)

128-T. Iron-Ore Handling and Preparation. Use of Conveyors at East Moor Works of Guest Keen Iron and Steel Co., Ltd. T. H. Keen. *Iron and Coal Trade Review,* v. 176, Jan. 24, 1958, p. 197-202.
(T28r, W12r, 1-52; Fe, RM-n)

129-T.* A Progress Report on Titanium-Alloy Fasteners. John Van Hambersveld. *Machine Design,* v. 30, Jan. 23, 1958, p. 123-127.

Major advances in heat treating and fabrication techniques have combined to produce high-strength fasteners with good fatigue resistance under aerodynamic loads.
(T7f, 17-57; Ti)

130-T.* Properties, Application, and Examination of Ferrous Metals Used in Colliery Engineering. J. Pettit. *Mining Electrical and Mechanical Engineer,* v. 38, Jan. 1958, p. 195-204.

Types of metal, tests used to show characteristics, heat treatment and applications, with some design data; examination during use and wear. 17 ref. (T28, 17-57; ST, CI)

131-T.* Piping Systems and Metallurgy for Nuclear Applications. *Power Engineering,* v. 61, Dec. 1957, p. 114-118.

Basic mechanism of radiation damage and its manifestations (vacancies, thermal spikes, interstitials, impurity atoms, radiation effects); effects on piping design and metals used in piping systems, especially where primary loops are involved; corrosion problems in nuclear systems; relative merits of steel castings versus forgings for primary loop applications.
(T11p, 17-57, M25, M26, 2-67)

132-T. Plutonium-Aluminum Fuel Element Development. M. D. Freshley. Hanford Atomic Products Operation. *U. S. Atomic Energy Commission,* HW-52457, Sept. 18, 1957, 44 p.

21 ref. (T11g, 17-57; Pu, *Al*)

133-T. Zirconium Moderator Reflector Can Development for the SRE. J. A. Leppard. Atomics International. *U. S. Atomic Energy Commission,* NAA-SR-2006, Dec. 15, 1957, 35 p. (Available at U. S. Office of Technical Services, $.30.)

The graphite moderator used in the Sodium Reactor Experiment is sealed against the liquid sodium coolant by being enclosed in Zr cans. The cans are fabricated of hafnium-free unalloyed Zr sheet, 0.035 and 0.100 in. thick. Fabrication procedures, welding techniques and sequences, testing of full-size assemblies, and extensive investigation and testing of the can head structure. 4 ref. (T11h, G1, K1d, 17-57; Zr)

134-T.* (German.) **Hard Metal Tools for Reshaping and Cutting.** J. Witthoff. *Draht,* v. 8, Nov. 1957, p. 465-470.

Properties of hard metals. Advantages for tools include precise machining, high-quality products, time saving, low production costs. Mostly tungsten carbide-cobalt alloys are used. Tungsten content influences favorably the hardness, cobalt content increases bending strength.
(T6n, Q-general, G17; W, Co, 6-69)

135-T.* (German.) **Recent Experiences With Multi-Purpose Hard Metals.** J. Witthoff. *Werkstattstechnik und Maschinenbau,* v. 47, Nov. 1957, p. 603-610.

Composition and properties of various types of hard metal tools.
(T6n, Q-general; SGA-j, 6-69)

136-T. What We Need in High Temperature Materials. Pt. 2. A. J. Carah. *Iron Age,* v. 181, Jan. 30, 1958, p. 102-104.

Need for new high-temperature materials and methods for fabricating and joining them.
(T24, 17-57; SGA-h)

137-T. French Developments in Sintered Ceramic Cutting Tools. Leon Gion and Louis Perrin. *Machinery,* v. 91, Dec. 20, 1957, p. 1420-1430.

Manufacture of sintered oxide ceramics and tests on the application and behavior of the material when used for cutting tool tips. Tests included the machining of various grades of steel and cast iron, and gave information on effects of various rates of feed, surface speed and depth of cut.
(T6n, G17, 17-57; 6-70)

138-T.* Where to Use the New Semiconductor Materials. Robert K. Willardson and Theodore S. Shilliday. *Materials in Design Engineering,* v. 47, Mar. 1958, p. 114-118.

Properties and applications of high-temperature rectifiers and transistors, galvanomagnetic devices, thermistors, optical and thermo-electric devices. (T1, X25, 17-57; EG-j)

139-T. Materials and Processes in Manufacture of Costume Jewelry. Ralph H. Atkinson. *Metal Progress,* v. 73, Mar. 1958, p. 74-78.

Skilled artisanship and mass production are combined to satisfy a growing demand for inexpensive jewelry with a fine jewelry appearance. (T9s, 17-57)

140-T.* A High-Strength Cast Steel. C. G. Mickelson and R. D. Engquist. *Metal Progress,* v. 73, Mar. 1958, p. 97-98.

A low-alloy, Mn-Cr-Mo cast steel with boron and rare earth additives which can be heat treated to tensile strengths above 220,000 psi. possesses excellent ductility and impact properties plus great wear resistance in dipper teeth, chute liners and tractor shoes.
(T28, 17-57, Q-general; AY, 5-60)

141-T.* Instrument Bearings for 300° F. and Up. Neil A. Sinclair. *Product Engineering,* v. 29, Feb. 3, 1958, p. 72-75.

Bearing materials and lubricants for high-temperature operation.
(T7d, X-general, 2-62; NM-h)

142-T. (French-German.) **Venetian Blinds Made of Light Alloy Materials.** M. Spechsa. *Aluminium Suisse,* v. 8, Jan. 1958, p. 3-10.

(T10k, 17-57; Al, Mg)

143-T. (French-German.) **Aluminum in the Construction of Automatic Equipment for the Food Processing Industry.** R. Liegaut. *Aluminium Suisse,* v. 8, Jan. 1958, p. 11-16.

(T29p, 17-57; Al)

144-T. (French-German.) **Use of Movable Partitions as Office Dividers.** P. Suter. *Aluminium Suisse,* v. 8, Jan. 1958, p. 17-24.

(T26n, 17-57; Al, Mg)

145-T. (French-German.) **New Covered Parking Lot for Automobiles.** R. Voetlin. *Aluminium Suisse,* v. 8, Jan. 1958, p. 25-30.

Design and construction details of aluminum alloy and concrete stalls.
(T26n, 17-57; Al)

146-T. (French-German.) **New Aluminum Scaffolding for Construction Workers.** *Aluminium Suisse,* v. 8,

Jan. 1958, p. 32-33.
(T26n, 17-57; Al)

147-T. (French-German.) **Use of Copper for Facades in Finnish Architecture.** Erkki Valve. *Pro-Metal,* v. 10, Dec. 1957, p. 911-915.
(T26n, 17-57; Cu)

148-T. (German.) **Status of Ceramic Cutting Tools.** A. Richter. *Fertigungstechnik,* v. 7, Nov. 1957, p. 489-493.
Comparison of the wear of ceramics and hard metals in machining. Ceramics have a greater resistance to temperature than hard metals and the higher cutting speed, but their manufacture is costly.
(T6n, 17-57, G17; SGA-j, 6-70)

149-T. (German.) **Ceramic Cutting Tools.** E. Heymel. *Fertigungstechnik,* v. 7, Nov. 1957, p. 496-497.
(T6n, G17; SGA-j, 6-70)

150-T. (German.) **Piston Rings of Sintered Steel.** E. Baumgartl. *Fertigungstechnik,* v. 7, Nov. 1957, p. 501-504.
Piston rings of sintered steel are equal in some respects to cast iron rings, and superior to them in many others. Attempts have been made in many countries to use piston rings of sintered steel in internal combustion engines.
(T21b, 17-57, Q-general; ST, 6-72)

151-T. (German.) **Titanium Carbide Hard Metals for Cutting Tools.** R. Wehner and R. Kohlermann. *Fertigungstechnik,* v. 7, Nov. 1957, p. 498-500.
TiC can be considered as the only hard metal with high resistance to wear; comparison with tungsten carbide and ceramic materials; problem of eliminating the free carbon. 10 ref. (T6n, 17-57; Ti, 6-69)

152-T. (German.) **Ceramic Tools and Their Use.** E. Heymel. *Fertigungstechnik,* v. 8, Jan. 1958, p. 2-8.
Description of various ceramics, their properties and applications. Sharpening of ceramic tools.
(T6n, 17-57; 6-70)

153-T. (Japanese.) **Ceramic Cutting Tools.** Makoto Okoshi and Toshio Sata. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 691-696.
(T6n, 17-57; 6-70)

154-T.* **Cast Iron for Glass Molds.** R. Barton. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Feb. 1958, p. 146-156.
Composition and microconstituents of cast iron; principal properties required in cast iron used as a material for glass molds and the effect of changes in composition and structure on these properties. A straight unalloyed iron with 3.4 to 3.6% total carbon, 1.8 to 2.2% Si, 0.12% max. S, 0.45 to 0.8% Mn, and 0.4% max. P has served the general purposes of the glass industry as satisfactorily as the more elaborate irons. (T29a, 2-60, 17-57; CI)

155-T. Metallic Materials of Construction. M. Birkhead. *Chemical and Process Engineering,* v. 38, Oct. 1957, p. 396-398.
(T26, T29, 17-57)

156-T.* **Survey Hot-Work Tool Steels for Aircraft and Missiles.** R. J. Nekervis, C. H. Lund and A. M. Hall. *Iron Age,* v. 181, Feb. 27, 1958, p. 99-102.
General review of properties of six alloy steels with applications for aircraft and missiles.
(T24, 17-57, Q-general; TS-k)

157-T. Making Titanium Pressure Vessels. *Metal Industry,* v. 92, Jan. 17, 1958, p. 49-50.
High-strength, low-weight pressure vessels for storage of oxygen, helium and carbon dioxide aboard supersonic aircraft and missiles have been fabricated from 6 Al-4V titanium alloy. (T24d, T26q, 17-57; Ti, *Al, V*)

158-T. Tool Steels for Aircraft. L. V. Klaybor. *Steel Processing and Conversion,* v. 44, Jan. 1958, p. 16-18.
Properties of high speed toolsteels as applied to aircraft structural components. (T24a, 17-57; TS-m)

159-T.* **New Steel for Hot Airplanes and Missiles.** M. E. Carruthers. *Steel Processing and Conversion,* v. 44, Jan. 1958, p. 19-23.
Mechanical properties and heat treatment of Mo PH 15-7 stainless steel for missiles and hot airplane parts. (T24a, 17-57; SS, *Cr, Ni, Mo*)

160-T.* **Use of Magnesium in Future Aircraft and Missile Structures.** John H. Rizley and Robert E. Mihalco. Paper from "Magnesium in Perspective", Magnesium Association, p. 1300-1310.
(T24a, T24c, 17-57; Mg)

161-T. Magnesium, 2000 A. D. R. M. Brick. Paper from "Magnesium in Perspective", Magnesium Association, p. 1400-1406.
(T-general, 17-57; Mg)

162-T.* **Use of Magnesium in Electronic Structures.** H. R. Bullock.

Paper from "Magnesium in Perspective", Magnesium Association, p. 1601-1605.

Corrosion resistance, stretch forming, design principles, material strength of Mg alloys.
(T1, A-general, 17-57; Mg)

163-T.* (Czech.) **Reasons for Short Life of Springs.** Frantisek Benes. *Hutnické Listy,* v. 13, Jan. 1958, p. 22-26.

Material defects or spring overstressing and surface defects causing fractures. Fractures in springs intended for injection pumps may be due to faulty manufacture (e.g., equipment for heat treatment, and impurities in the material); resonant vibration also contributes. In springs made of quenched wire, failures are less frequent. 10 ref. (T7c, 17-57, 9)

164-T. (German.) **Behavior of Aluminum Facades Under Earthquakes in Mexico.** H. Grathwohl. *Aluminium,* v. 34, Feb. 1958, p. 78-81.

(T26n; Al)

165-T. (German.) **Aluminum in Radar Equipment.** H. Meier. *Aluminium,* v. 34, Feb. 1958, p. 102-103.

(T1, X15q; Al, 17-57)

166-T. (German.) **Service Life of Anti-Friction Bearings.** L. Hasbargen. *Werkstatt und Betrieb,* v. 91, Mar. 1958, p. 120.

(T7d, Q9p)

167-T. (Italian.) **Aluminum in Cigarette Packaging.** *Alluminio,* v. 27, Jan. 1958, p. 20-23.

Types of Al packaging materials used in U. S. and Italy.
(T10g, 17-57; Al, 4-56)

168-T.* **Corrugated Steel Foil Promises Lighter, Stronger Aircraft.** Bruce Mitchell. *Iron Age,* v. 181, Feb. 6, 1958, p. 102-104.

Aircraft can either be 25% lighter, or without adding any weight, can be made to withstand aerodynamic heating to 750° F. This can be done by putting miniature corrugations in very thin sheets of high-strength stainless steel, such as 17-7PH alloy. (T24, 17-57; SS, 4-56)

169-T. **Aluminum in 1958 Autos.** *Light Metal Age,* v. 16, Feb. 1958, p. 12-13.

(T21a, T21c, 17-57; Al)

170-T.* **Fuel Elements.** *Power Reactor Technology,* v. 1, Dec. 1957, p. 21-30.

Nuclear performance, neutron absorption, dimensional stability, thermal and other physical properties of fuel elements composed of U, U-Zr, U-Cb, U-Mo, U-Si, U-Pu, Th, Th-U and uranium dioxide. Results of irradiation tests on uranium dioxide fuel elements; addition of beryllia, beryllium, ceria, silica, silicon, silicon nitride, or zirconia. Properties of fuel elements of low fuel content including U-Al, U-Zr, U-Mg and other alloys and dispersions. 22 ref. (T11g, 17-57; U-b)

171-T.* **Other Reactor Materials.** *Power Reactor Technology,* v. 1, Dec. 1957, p. 30-33.

Literature review outlining the mechanical properties and effect of irradiation on control material including boron alloys, cadmium and rare earth dispersions. Moderator, shielding and structural materials including graphite, lithium hydride, magnesium oxychloride, carbon and stainless steel, beryllium and magnesium alloys. 8 ref.
(T11, 17-57, 2-67; Cd, SS, Be, Mg, EG-g)

172-T. (French.) **Copper Roofing: Special Application of Leaded Copper.** *Cuivre Laitons Alliages,* no. 41, Jan-Feb. 1958, p. 11-12.

(T26n, 17-57; Cu)

173-T. (French.) **A Copper Skyscraper.** *Cuivre Laitons Alliages,* no. 41, Jan-Feb. 1958, p. 15-17.

Exclusive use of Cu for exterior and interior. Artificial Cu patina by "Cabra spray process".
(T26n, 17-57; Cu-b)

174-T. (French.) **Copper and Copper Alloys in Industry.** *Cuivre Laitons Alliages,* no. 41, Jan-Feb. 1958, p. 31-33.

(T10c, 17-57; Cu, Cu-n)

175-T. (Polish.) **Some Causes of Damages and Cracks in Rails.** Janusz Lesiecki and Jerzy Rys and Stanislaw Rudnik. *Hutnik,* v. 24, Nov. 1957, p. 457-462.

6 ref. (T23q, 9-72; ST)

176-T. **Are Tool Steels the Answer to High-Speed Flight?** Joseph H. Mainhardt and John P. Wright. *American Machinist,* v. 102, Mar. 10, 1958, p. 106-110.

Preliminary design data on formability, machinability, decarburization control, and heat treatment of hot-work H-11 (5 Cr-Mo-V) toolsteel in both sheet and bar form. Its projected use is for aircraft structures which must meet the basic requirements of strength and temperature resistance. (T24a, 17-57; TS)

177-T. Ceramic Tools Gather Momentum. *American Machinist,* v. 102, Apr. 21, 1958, p. 122-124.

(T6n, G17; 6-70)

178-T. Boron-10, New Atomic Material Available for Commercial Use. *Inco,* v. 27, Dec. 1957, p. 24-26.

Refining and production of B^{10} by reaction of boron trifluoride and di-methyl ether, distillation of the complex, followed by electrolysis. (T11, C-general, 17-57; Ni-b, B)

179-T. Beryllium Research. *Metal Industry,* v. 92, Mar. 28, 1958, p. 255-256.

Research on Be as a possible fuel-canning material. Toxic properties demand stringent precautions. (T11g, 17-57, A7q; Be)

180-T.* Cermets in Jet Engines. J. W. Graham and W. F. Zimmerman. *Metal Progress,* v. 73, Apr. 1958, p. 108-111.

Despite the extensive experimental work in the last ten years, cermets, because of their inherent low impact strength, have not proved suitable for jet engine components. Since substitutes with the needed properties have become available, research work on cermets is now confined to basic principles. (T7h, 17-57; SGA-h, 6-70)

181-T. Nylon-Clad Sleeve Bearings. D. L. Penney and F. J. Bockhoff. *Product Engineering,* v. 29, Mar. 3, 1958, p. 52-54.

(T7d, 17-57; NM-d, 8-66)

182-T. Production of Ball and Roller Bearings. Methods Employed by the Hoffmann Manufacturing Co., Ltd. *Machinery (London),* v. 92, Apr. 4, 1958, p. 779-782.

(T7d, G-general)

183-T. Tungsten Carbide Lamination Die. *Machinery (London),* v. 92, Apr 4, 1958, p. 783-784.

(T6r; 6-69, W)

184-T. Economies Obtained by Using Extruded and Die Cast Aluminum Parts. Herbert Chase. *Machinery (London),* v. 92, Apr. 4, 1958, p. 798-800.

(T21b, 17-57; Al, 4-58, 5-61)

185-T. Exotic Metals Seek Employment. Annesta R. Gardner. *Product Engineering,* v. 29, Mar. 17, 1958, p. 66-70.

Gallium, indium, bismuth, beryllium, chromium, vanadium, hafnium, columbium and rhenium for special structural and electrical problems requiring special properties. (T1, T26, 17-57, Q-general; Ga, In, Bi, Be, Cr, V, Hf, Cb, Re)

186-T. Nonferrous Role in "Birds". *Steel,* v. 142, Apr. 14, 1958, p. 96-97.

U. S. missile program. (T24e, 17-57; Al, Mg, Ti, Be, Cu)

187-T. (French.) Applications of Molybdenum and Its Compounds in the Chemical Industry. (Continued.) H. Beduneau. *Revue des Produits Chimiques,* v. 61, Jan. 31, 1958, p. 3-7.

49 ref. (To be continued.) (T29, 17-57; Mo)

188-T. (German.) Aluminum, New Application Possibilities. H. A. Kirsch. *Chemische Rundschau,* v. 11, Jan. 1958, p. 1-4.

Aluminum as a construction material and its application in the manufacture of large equipment. (T26, 17-57; Al-b)

189-T. (German.) Aluminum and Copper for Long-Distance Cable Lines. H. Mors. *Metall,* v. 11, Nov. 1957, p. 949-954.

Designs for the masts and clamps for high-voltage power transmission. (T1b, 17-57; Al-b, Cu-b)

190-T. (German.) Manufacturing Aluminum Sheathed Cables. H. D. Feldmann. *Metall,* v. 12, Mar. 1958, p. 204-208.

Object of sheathing cables. Lead is more resistant to corrosion than aluminum. Advantages of Al include lower specific weight, higher mechanical strength, high conductivity, which permit economies in production and transport costs. (T1b, 17-57, Al)

191-T. Conference on Aircraft Manufacture. *Light Metals,* v. 21, Apr. 1958, p. 118-123.

Papers from conference on "Problems of Aircraft Production" by Institution of Production Engineers. (T24, 17-57; EG-a39)

192-T. Aluminum in Rockets and Missiles. Don Fabun. *Modern Metals,* v. 14, Apr. 1958, p. 30-44.

Results of recent survey of Al usage in 60 missile programs reflect applications, advantages, limitations of the metal. (T24e, 17-57, Al)

193-T. Big Role for Magnesium in Missiles. *Modern Metals,* v. 14, Apr. 1958, p. 46-52.

Uses of Mg in current missile production, possible potentials, making fullest use of physical properties. (T24e, 17-57; Mg)

194-T. Outlook for Titanium in Missiles. R. C. Durstein. *Modern Metals,* v. 14, Apr. 1958, p. 64-65.

(T24e, 17-57; Ti)

195-T. This Bolt Holds Better. *Steel,* v. 142, Mar. 31, 1958, p. 82-83.

Knurled shank cold works bolt hole and greatly improves resistance to shear in bolted joints. Lab tests and first applications indicate some reduction in labor costs. (T7f, Q27a)

196-T. (Czech.) **Manufacture of High-Quality Seamless Tubes for Petroleum and Geological Research.** Osvald Pejcoch and Josef Cerveny. *Hutnické Listy,* v. 13, Jan. 1958, p. 2-9.

Manganese alloy steel tubes are given a special normalizing treatment. 10 ref. (T28p, J24; *Mn,* AY)

197-T. (Czech.) **Breakdown of Welded Bridges in Belgium.** J. Sevcik. *Zvaranie,* v. 7, Jan. 1958, p. 15-18.

(T26p, 7-51, 9-71)

198-T. (French.) **Metalloplastic Thread.** Maurice Victor. *Revue de l'Aluminium,* v. 35, Jan. 1958, p. 67-72.

Aluminum thread coated with transparent acetate film is low-cost, corrosion resistant, smooth, colorfast, versatile, lightweight. Can be reduced to a 0.0078 in. width. (T10, 17-57; Al-b)

199-T. Zircaloy Tube for Nuclear Power: Extrusion and Coldworking Present Many Problems. J. S. Rodgers. *Canadian Metalworking,* v. 21, Apr. 1958, p. 24, 26.

(T11q, F24, G-general, 1-67, 17-57; Zr-b)

200-T. Replacing Heavy Metal Castings by Light Alloy Castings. Hermann Kessler. *Light Metals,* v. 21, Feb. 1958, p. 57-59. (From *Giesserie,* v. 42, 1955, p. 307-309.)

Previously abstracted from original. See item 104-T, 1955. (T-general, Al)

201-T. Production of Ball and Roller Bearings. *Machinery (London),* v. 92, Mar. 1958, p. 640-652.

Methods and equipment at Hoffmann Mfg. Co., Chelmsford, Essex; use of stainless steel, mild steel and brass. (T7d, 17-57; SS, CN, CU-n)

202-T. Semiconductors—Revolution at Your Elbow. *Product Engineering,* v. 29, Apr. 14, 1958, p. 60-63.

Use of semiconductors for transistors, solar cells, rectifiers, thermoelectric junctions, thermistors and electroluminescent panels. (T1, 17-57; EG-j)

203-T. Preview of Space Age Metals. *Steel,* v. 142, May 5, 1958, p. 86-87.

Tables indicating major airframe components and their alloys, major jet engine components and their alloys, major missile components and their alloys. (T24; 17-57)

204-T.* Molybdenum for Aircraft Gas Turbine Applications. R. T. Begley. Paper from "The Metal Molybdenum", American Society for Metals, p. 408-419.

Main advantages of Mo and Mo-base alloys for jet engine applications are excellent high-temperature strength, good fatigue properties, high modulus of elasticity. Disadvantages are lack or oxidation resistance, relatively high density, difficulty of obtaining high-strength joints. (T24b, 17-57; Mo)

205-T. (French.) **Light Metal Coating of Auxiliary Dams at Rheinaus Hydroelectric Plant.** R. Vogtlin. *Aluminium Suisse,* v. 7, Nov. 1957, p. 212-218.

(T26s, 17-57; EGa-39, 8)

206-T. (French.) **Aluminum and Its Application in Dams.** Lothar J. Streuli. *Aluminium Suisse,* v. 7, Nov. 1957, p. 219-224.

Light weight, resistance to wear and corrosion properties of Al have led to its replacing wood and steel. (T26s, 17-57; Al)

207-T. (French.) **Light Metal Lock Gates.** Ernst Amstutz. *Aluminium Suisse,* v. 7, Nov. 1957, p. 225-229.

Locks for dams made partly of Al alloys resist galvanic corrosion. (T26s, 17-57, R1a; Al)

208-T. (French.) **Lead Pipes in Chemical and Construction Industries.** J. Chauvin. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 359-361.

(T26, T29, 17-57; Pb, 4-60)

209-T. (French.) **Aircraft Production Techniques in French Plants.** Paul Badré. *Metallurgie et Construction Mecanique,* v. 90, Mar. 1958, p. 181-193.

(T24)

210-T. (French.) **Possibilities Offered by Light Metals in Automobile Decoration.** Charles Guinard. *Revue de l'Aluminium,* v. 35, Mar. 1958, p. 303-309.

(T21a, T21c, 17-57; Al, Mg)

211-T. (Russian.) **Solution of Problems of Rail Steel.** D. S. Kazarnovsky. *Stal',* Feb. 1958, p. 138-144.

Lengthening the life of rail steel by means of heat treatment of car-

bon steel rails, use of alloy steels for most strained sections of tracks and improvement of rail shape. 17 ref.
(T23g, J-general, 17-51, 17-57; AY, CN)

212-T. Stainless Steels for the Petroleum Industry. A Comparison of British and American Qualities. F. A. Kirk and J. Williams. *British Petroleum Equipment News,* v. 6, no. 3, 1957/1958, p. 40-46.

(T29n, 17-57; SS)

213-T. The Motor Coach and Aluminum. Leonard C. Rowe. *Corrosion,* v. 14, Apr. 1958, p. 163t-164t.

(T21d, 17-57; Al-f)

214-T. Use of High Strength Steel to Lighten Supersonic Aircraft. Bruce Mitchell. *Industrial Laboratories,* v. 9, Mar. 1958, p. 61-66.

High-strength steel can be used both for structural and nonstructural parts with savings in weight of more than 25% over past design with Al on Ti. This saving is possible because full strength of material can be used.
(T24, 17-57; ST, SGB-a)

215-T. Steel-Foil Corrugated Panels for Lightweight, High-Strength Structures. Bruce Mitchell. *Machine Design,* v. 30, Feb. 20, 1958, p. 179-181.

Use for airframes.
(T24a, 17-57; ST, 4-56)

216-T. 1958 Missile Materials Review. Alfred J. Zaehringer and Raymond M. Nolan. *Missiles and Rockets,* v. 3, Mar. 1958, p. 69-75.

Industry use and development of present and future materials.
(T24e; 17-57, SGA-h)

217-T. Aluminum: For Missiles in Production. Don Fabun. *Missiles and Rockets,* v. 3, Mar. 1958, p. 85-87.

(T24e, 17-57; Al-b)

218-T.* Metallurgical Problems in Fabrication of Zirconium-Clad Fuel Elements for Pressurized Water Reactors. R. B. Gordon. *Nuclear Science and Engineering,* v. 3, Mar. 1958, p. 232-249.

Fabrication of a variety of fuel materials which are compatible with Zr cladding. Homogeneity and melting crucible problems still exist with some of the fuel alloys. Zr-clad fuel elements of the bonded type are produced by pack rolling or coextrusion of the fuel and cladding. Unbonded fuel elements; dimensional control and welding. 5 ref. (T11g, 17-57, L22; Zr)

219-T. The Steel Sandwich. Howard S. Orr. *Pacific Factory,* v. 89, Mar. 1958, p. 48-52.

Production of thin stainless and alloy steels to meet light-weight needs of aircraft and missile construction. (T24a, 17-57; SS, 7-59)

220-T. For the Widest Variety of Industrial Jobs Use Powder Metallurgy Gears. *Powder Metallurgy Quarterly,* Spring 1958.

With new techniques, improved powders, sintering furnaces and presses, powder metallurgy is fast becoming a method of choice for producing heavy structural parts with close tolerances, high strength and shock resistance, at substantial cost savings.
(T7a, 17-57, H-general, 6-72)

221-T. Fasteners for Non-Ferrous Castings. *Precision Metal Molding,* v. 16, May 1958, p. 56-58.

Inserts, tapping screws, nuts, retaining rings and pins.
(T7f; 5-61, 5-63, EG-a38)

222-T. Germanium and Silicon Take the Lead Among Semiconductor Rectifiers. Raymond A. York. *Product Engineering, Design Edition,* v. 29, May 12, 1958, p. 89-91.

(T1, 17-57; Ge, Si)

223-T. Missile Production Requires New Techniques. Frank R. Swaney. *Tool Engineer,* v. 40, May 1958, p. 81-84.

Machining, welding and cleaning operations.
(T24e, G17, K-general, L-general)

224-T. A Brief Study of the Suitability of Titanium and a Titanium Alloy as Firewall Material. C. A. Hughes. Civil Aeronautics Administration. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131392, Sept. 1957, 10 p. $.50.

(T24a, Q-general, 2-62, 17-57; Ti)

225-T. Status of High-Strength Steels for the Aircraft Industry. R. J. Nekervis, C. H. Lund and A. M. Hall. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121639, Jan. 1958, 106 p. $2.75.

(T24a, 17-57; ST, SGB-a)

226-T. Coiled Stainless Steel Tubing. Pt. 1, 2. J. J. Chmura, Jr., R. D. Stouffer, A. N. Winter, J. T. Hudson and L. F. Freitag. Martin Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131719, PB 131720, Dec. 1957, 2 v. 181 p. $4.

Seamless ¼-hard stainless steel best for coiled applications; instruc-

tion for designers in using metal tubing to solve problems requiring flexibility or relative motion in aircraft systems. (T24d, Q-general; SS, 4-60, 17-51, 17-57)

227-T. Space Age Materials Needs Await Metallurgy Progress. R. H. Thielemann. *Western Metalworking,* v. 16, Apr. 1958, p. 45.

(T24, SGA-h)

228-T. Corrosion Attack Target of Metal Development for Petrochemical Use. E. H. Edwards. *Western Metalworking,* v. 16, Apr. 1958, p. 49.

(T29m, 17-57, SGA-g)

229-T. Missile Braze Alloys Meet Wide Temperature Range. A. T. Cape. *Western Metalworking,* v. 16, Apr. 1958, p. 50-51.

(T24e, Q-general, 17-57; SGA-f)

230-T. Use of Low Grade Lead and Antimony in Acid Accumulators. M. A. Dasoyan. *Journal of Applied Chemistry of the USSR,* v. 29, no. 12, (1957), p. 1965-1978. (Translation by Consultants Bureau, Inc.)

Experiments show that impurities removed in refining are not only harmless but even useful in improving corrosion resistance of battery grids. 12 ref. (T1, 17-57, R6g; Pb)

231-T. (English.) **Structural Steelwork for the United States Pavilion at the 1958 Exhibition, Brussels.** Hans Hähl. *Acier Stahl Steel,* no. 2, 1958, p. 51-59.

(T26n, 17-57; ST)

232-T. (French.) **Copper and Brass in Contemporary American Architecture.** *Cuivres-Laitons-Alliages,* no. 42, Mar-Apr. 1958, p. 3-5.

(T26n, 17-57; Cu-b, Cu-n)

233-T. (French.) **Atomic Industry Metals: American Stainless Steels.** *Metallurgie et Construction Mecanique,* v. 90, Apr. 1958, p. 255-257.

Properties of metals used, slow neutron absorption, influence of alloying elements. (T11, 17-57; SS)

234-T. (French.) **High Pressure Vessel Strength.** R. Epain. *Metallurgie et Construction Mecanique,* v. 90, Apr. 1958, p. 263-271.

(Concluded.) (T26q, Q27)

235-T. (French and German.) **Use of Nonferrous Metals for Fire Truck Engines.** H. Vogt. *Pro-Metal,* no. 61, Feb. 1958, p. 926-929.

(T21b, T21e, 17-57; EG-a38)

236-T. (French and German.) **High-Quality Plumbing Hardware.** *Pro-Metal,* no. 61, Feb. 1958, p. 930-932.

(T6s, 17-57; Cu-n, Cu-s)

237-T. (French and German.) **Variety and Standardization of Brass Plumbing Hardware.** W. Baumann. *Pro-Metal,* no. 61, Feb. 1958, p. 947-948.

(T6s, S22; Cu-n)

238-T.* (German.) **Single Crystals and p-n Junction Crystals of Aluminum Antimonide.** Hans Achim Schell. *Zeitschrift für Metallkunde,* v. 49, Mar. 1958, p. 140-144.

Drawing of single crystals; drawing of p-n junctions. Physical properties of crystals; corrosion resistance; tempering and surface treatment. Application of crystals as rectifiers. (T1, 17-57, P15; Al, 14-61)

239-T. (Rumanian.) **Experimental Investigations on the Specific Properties of Rumanian Hard Metal-Ceramic Materials for Machining of Metals.** Elena Labusca and Nicolae Labusca. *Studii si Cercetari de Metalurgie,* v. 2, no. 1-2, 1957, p. 121-136.

9 ref. (T6n; 6-69, 6-70, SGA-j)

240-T. (Rumanian.) **Utilization of Nodular Graphite Castings for the Construction of Farm Machinery.** K. Stefanescu, V. Vines and L. Sofroni. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 321-336.

(T3, 17-57; CI-r)

241-T. (Rumanian.) **Improvement of the Process of Steel Railroad Tire Production at the Resita Metallurgical Combine.** R. Miculescu. *Studii si Cercetari de Metalurgie,* v. 2, no. 3, 1957, p. 351-360.

(T23p; ST)

242-T. The Heat Factor: Cutting Tool Temperatures, Ceramics Versus Carbides. N. H. Cook. *Automatic Machining,* v. 19, May 1958, p. 42-45.

(T6n, G17; 6-69, 6-70)

243-T. Survey Hot-Work Tool Steels for Aircraft and Missiles. R. J. Nekervis, C. H. Lund and A. M. Hall. *Iron Age,* v. 181, Mar. 6, 1958, p. 120-121.

(T24a, T24e, Q-general, 17-57; TS-k)

244-T. A 225,000 Psi. Steel. C. G. Mickelson and R. D. Engquist. *Mechanical Engineering,* v. 80, Apr. 1958, p. 70-71.

Wearpact: a complex low-alloy cast steel for mining equipment, using a minimum of critical materials; basic physical properties, such as density, thermal expansion and conductivity, specific heat, resistivity and others. Technical and

economic advantages. (T28, 17-57, Q-general, P-general; AY)

245-T. Magnesium Makes Ground Heater Portable. *Modern Metals,* v. 14, May 1958, p. 42-43.

(T24e, 17-57; Mg-b)

246-T. Powder Metal Shanks Reduce Chatter. C. G. Erickson. *Tool Engineer,* v. 40, Mar. 1958, p. 107-109.

(T6n, 17-57; 6-72, 6-69)

247-T. (Italian.) **Applications of Nickel and Alloys Containing Nickel in Nuclear Power Plants.** *Nickel,* Feb. 1958, p. 1-8.

(T11, 17-57; Ni-b)

248-T. (Japanese.) **Canning and Other Methods of Jacketing Reactor Fuel Elements.** K. Ono and T. Hancho. *Metals,* v. 28, Apr. 1958, p. 279-283.

11 ref. (T11g)

249-T.* Special Steels in the Atomic Industry. *Aciers Fins & Speciaux,* no. 28, Mar. 1958, p. 40-45.

Application and properties of AISI 347, 318, 304 and other steels in nuclear reactor components.
(T11, 17-57; SS)

250-T. Meeting the Requirements of a Modern Industry. *Edgar Allen News,* v. 36, Nov. 1957, p. 244-246.

Molds for plastics.
(T29s, 17-57; ST)

251-T. Behavior of Bearings Made of High Temperature Materials. Arthur S. Irwin. *Society of Automotive Engineers,* v. 17D, Jan. 1958, 3 p.

(T7d, 17-57; ST, SGA-h)

252-T. (Book.) **Aluminum in Modern Architecture.** 118 p. 1958 Ed. Reynolds Metals Co., Louisville, Ky.

Use of Al in 26 recent buildings in different parts of the world. Architectural application of anodized Al; anodizing practice including preliminary mechanical finishing, cleaning, etching, chemical brightening, anodizing, neutralizing, coloring and sealing.
(T26n, 17-57, L19; Al)

253-T. Metallurgy and Aeronautical Progress. A. J. Murphy. *British Foundryman,* v. 51, May 1958, p. 227-238.

Review of aircraft materials including duraluminum and alloys based on Al-Zn-Mg. Relation of these materials to fatigue. 21 ref.
(T24, Q7, 17-57; Al-b)

254-T.* Missiles Metallurgy. J. R. Townshead. *Canadian Mining Journal,* v. 79, Apr. 1958, p. 83-86.

Immediate and long-range materials development of Ti, Mg, Ni and Mo alloys.
(T24e, 17-57; Ti-b, Mg-b, Ni-b, Mo-b)

255-T. Precipitation Hardening Alloys With Beryllium Additions. R. Reinbach. *Draht (English Edition),* no. 34, Apr. 1958, p. 34-35.

Main application of the alloys based on Cu, Ni, Co and Fe is for springs, for wear resistant drive parts in precision instruments, nonmagnetic ball, roller and sleeve bearings, surgical instruments, nonsparking tools as well as for extrusion and press molds for plastics. 4 ref.
(T-general, N7a; Cu, Ni, Co, Fe, *Be*)

256-T.* Metallurgical Aspects of Nuclear Power Engineering. Pt. 3. J. C. Wright. *Engineer,* May 9, 1958, p. 686-689.

Physical metallurgy of the fissile fuel metals, uranium, plutonium, thorium. Methods of developing fuel elements, present and possible future methods of canning. 7 ref. (To be continued.)
(T11g, 17-57; U, Pu, Th)

257-T. Materials for Superheater Tubes and Supports. D. W. Crancher. *Institute of Marine Engineers, Transactions,* v. 70, Mar. 1958, p. 77-103.

41 ref. (T26q, 17-57, R4c, R7d; ST)

258-T. Electrical Steels: How to Choose and Improve Them. B. A. Ruediger. *Steel,* v. 142, June 9, 1958, p. 116-118, 120-121.

(T1, W11, 3-72; ST, *Si,* Fe)

259-T. Progress Report on the Development of Metal Fiber Paper. Hanns F. Arledter. *Tappi,* v. 41, Apr. 1958, p. 189-192.

Possibility of manufacturing metal fiber paper in continuous web on a pilot fourdrinier paper machine. Paper made of blends of 85 to 99% metal fibers with 1 to 15% cellulose, inorganic or organic synthetic fibers, as well as 100% metal fiber. (T29r, 17-57, H17)

260-T. Aluminum Applications in the Pulp and Paper Industry. Harry W. Fritts and David G. Vandenburgh. *Tappi,* v. 41, Apr. 1958, p. 54A-82A.

(T29r, 17-57; Al-b)

261-T. (French.) **An Aluminum Bell Hut for Army and Civilian Use.** Andre Chevrier. *Revue de l'Aluminium,* v. 35, Apr. 1958, p. 417-421.

(T26r, 17-57; Al)

262-T. (French.) **Aluminum in Chemical Engineering. Societe Ugilor's**

Plant at Saint-Avold for Manufacture of Cyanhydric Acid. Maurice Victor. *Revue de l'Aluminium,* v. 35, Apr. 1958, p. 439-446.
(T29m, 17-57; Al-b)

263-T.* (German.) New Developments in the Field of Cutting Tool Ceramics. C. Agte and R. Kohlermann. *Fertigungstechnik,* v. 8, Apr. 1958, p. 150-154.

Physical properties and cutting performance of oxide ceramics (Al_2O_3 + small additives of metal oxides), cermets (Al_2O_3 + metals) and oxide-carbide ceramics (Al_2O_3 + metal carbides). Comparison curves for the different types show effect of cutting speed on tool life. 14 ref. (T6n, 17-57; Al, 6-70)

264-T. (Italian.) Use of Niobium in Nuclear Plants. Renato Lazzerini. *Calore,* v. 39, Jan. 1958, p. 7-15.
7 ref. (T11, 17-57; Cb)

265-T. Rockets and Missiles. Robert L. Noland. *Chemical Engineering,* May 19, 1958, p. 148-151.

Materials of construction related to missile performance characteristics. (T24e, 17-57)

266-T. Metallurgical Aspects of Nuclear Power Engineering. Pt. 4. J. C. Wright. *Engineer,* May 16, 1958, p. 725-728.

Irradiation and corrosion effects. 10 ref. (T11, 17-57, R-general, 2-67)

267-T. Rare Metals—a Symposium. *Journal of Scientific & Industrial Research,* v. 17T, Mar. 1958, p. 120-122.

Metallurgy of uranium, thorium, plutonium, beryllium, zirconium and rare earths.
(T11, 17-57; Be, Th, Pu, U, Zr, EG-g)

268-T. Hand-Tool Production in a Swedish Factory. *Machinery (London),* v. 92, May 2, 1958, p. 1011-1015.
(T6p, G17, J23, 18-67)

269-T. Selecting Bearing Metals That Will Not Seize. C. L. Goodzeit. *Materials in Design Engineering,* v. 47, June 1958, p. 105-109.
(T7d, 17-57; SGA-c)

270-T.* PH Stainless for Hot Airframes. R. W. White. *Metal Progress,* v. 73, June 1958, p. 74-78.

Thermal problems of airframes which arise from aerodynamic and engine heating are becoming more severe. Sheet materials getting the most consideration for applications in skins and subsurface components are precipitation hardening stainless steels and Ti alloys. Use of PH stainless in aircraft and missile structures is increasing and the future is expected to bring many more applications. Ease of fabrication is a big point in their favor. (T24a, 17-57, J27; SS, 4-53)

271-T.* Needed: Facts on Space Age Metals. *Steel,* v. 142, June 16, 1958, p. 102-104.

Chicago ASM symposium on aircraft included: a stress-temperature chart of where metals are today with best alloy of each system; program for research suggesting evaluation of present materials under simulated space conditions; verification of laboratory results with materials and in defining space environments; variation of material strength between observation and theory; maximum use of total properties; developing composite materials; discussion of missiles, skin temperature, solid fuels, metal fuels, engines, refractory metals, Ti, Mg, Al and Be. (T24, 17-57, Q-general)

272-T. Survey of Basic Engineering Metallurgy Research Programs of the Division of Reactor Development. J. M. Simmons. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 3-8.

Five major areas of investigation covered by this program: fuel elements (plutonium, advanced types of fuel, fuel for high-temperature operation); metals, alloys and materials; components and equipment; control rods; production techniques. (T11, 17-57)

273-T. Fuel Dispersion in Stainless-Steel Component for Power Reactors. J. E. Cunningham, R. J. Beaver and R. C. Waugh. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 243-268.
26 ref. (T11g, 17-57; SS)

274-T. Fuel Dispersions in Aluminum-Base Elements for Research Reactors. J. E. Cunningham, R. J. Beaver, W. C. Thurber and R. C. Waugh. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, TID-7546, p. 269-297.

Potential methods for incorporating U^{235} fuel enriched to the 20% level, into Al plate type elements for service in high-performance research reactors. 15 ref.
(T11g, 17-57; Al, *Si,* U)

275-T. The Metallurgy and Fabrication of Uranium-Alloy Fuel Elements. R. W. Dayton. Paper from "Fuel Elements Conference", U. S. Office

of Technical Services, T1D-7546, p. 302-365.

Alloy types include the so-called "alpha-prime" alloys (containing 3 to 7% Cb and Zr), gamma-phase alloys (10 to 20% Mo or Cb), and epsilon-phase alloys (3.8% Si or 45 to 80% Zr). Alloy preparation by induction and arc melting, cladding the fuel alloys by brazing, roll bonding and pressure bonding. 87 ref. (T11g, 17-57, C5, L22; U-b)

276-T. Fast Reactor Fuel Development at Argonne National Laboratory. L. R. Kelman. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 751-777.

Use of U^{233}, U^{235} and Pu^{239} fissionable isotopes as fuel. 42 ref. (T11g, 17-57; U, Pu)

277-T. Plutonium-Aluminum Fuel-Element Development. M. D. Freshley. Paper from "Fuel Elements Conference", U. S. Office of Technical Services, T1D-7546, p. 789-811.

Safe handling of Pu; Pu fueled reactors; Al-Pu phase diagram; preparation of Al-Pu alloys. (T11g, 17-57; Pu, Al)

278-T. (Italian.) **Some Metallurgical Problems of the Structural Materials Used in Nuclear Reactors.** A. Erra and P. L. Lensi. *Metallurgia Italiana,* v. 50, Feb. 1958, p. 45-49.

8 ref. (T11, 17-57)

279-T. Sheet Steels for High-Speed Aircraft and Missiles. A. L. Feild and M. E. Carruthers. *Aerospace Engineering,* v. 17, June 1958, p. 41-44. (T24, 17-57; SS, 4-53)

280-T. Tool Up for High Speed Cutting. Pt. 1. The Potential of Ceramic Tools—a Close Look. W. G. McIntosh. *Canadian Metalworking,* v. 21, May 1958, p. 12-14. (T6n, 17-57; 6-70)

281-T. Niobium. W. S. Hazelton. *SAE Journal,* v. 65, May 1958, p. 67-69.

A prospect for aviation gas turbines. (T24b, 17-57; Cb)

282-T. Tooling for Ceramics. Norman Zlatin. *Tool Engineer,* v. 40, June 1958, p. 91. (T6n; 6-70)

283-T. Magnesium Tooling Cuts Costs. Karl F. Melde. *Tool Engineer,* v. 40, June 1958, p. 103-105. (T6n, 17-57; Mg)

284-T.* (Czech.) **Nuclear Fuels With Uranium Alloy Base.** Bohumil Prenosil. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 324-330.

Phase diagrams and other properties of uranium alloys low in Cr, Al, Mo, Zr and Cb and uranium alloys higher in Mo and Zr. 20 ref. (T11g, 17-57, M24, P-general; U-b)

285-T.* (Czech.) **Coatings of Reactor Fuel Elements.** Bohumil Prenosil. *Hutnicke Listy,* v. 13, no. 4, 1958, p. 330-334.

Aluminum, magnesium, zirconium and their alloys and austenitic stainless steels. Behavior of coating metal at elevated temperatures. 19 ref. (T11g, 17-57; Al, Mg, Zr, SS, 8)

286-T.* High Temperatures Spur Use of Nickel-Base Alloys. Pt. 2. T. E. Kihlgren. *Aviation Age,* v. 28, Mar. 1958, p. 130-134, 136-137.

Inconel, Inconel X, Inconel W, Inconel 702, Inconel 713C, Inconel 700, offer great promise as heat resistant materials for aircraft and missiles. (T24, 17-57; Ni. SGA-h)

287-T. Buildings Cast in Iron. Frederic Evans. *British Steelmaker,* v. 24, June 1958, p. 178-179. (T26n, 17-57, A2; CI)

288-T. New Carbide Dies Bring Big Savings at Low Cost. R. Dover. *Canadian Machinery,* v. 69, p. 160, 162.

Spark erosion is used to make blanking and piercing dies from solid carbide blanks. (T6r, G24a)

289-T. Is Our Future With Cemented Diamond Cutting Tools? C. B. Slawson. *Carbide Engineering,* v. 10, June 1958, p. 15-18.

Problems involved in manufacturing larger man-made diamonds and possible tool applications. (T6n; NM-k37)

290-T. Metallurgy. H. A. Holden. *Chemical and Process Engineering,* v. 39, Mar. 1958, p. 82-85.

Metals in atomic energy industry; welding developments; Al and Mg. 65 ref. (T11, 17-57, K-general; Al, Mg)

291-T. Choosing Resistant Material for Plant Construction. Pt. 1. Frank H. Slade. *Chemical Products and Chemical News,* v. 21, June 1958, p. 213-217.

Stainless steel as a material of construction for chemical plant. (T29, 17-57; SS)

292-T. Magnesium Branches Out. *Diamond,* v. 21, Mar. 1958, p. 25-27.

Nonstructural uses. (T-general, 17-57; Mg)

293-T. The Application of Modern Steels to Marine Construction. Pt. 1. Metallurgical and Welding Aspects.

Pt. 2. Design Aspects. Leon C. Bibber and John A. Gilligan. *Engineering Sciences, Technical Paper,* v. 5, no. 1, 1957, 12 p.
(T22, 17-57, K-general, 17-51; ST)

294-T. The Development of Columbium and Tantalum. *Mining Journal,* v. 250, Mar. 21, 1958, p. 325-326.
Use of Cb and Ta in relation to turbo jet engines, guided missiles, rockets and nuclear energy.
(T24, 17-57; Cb, Ta)

295-T. Niobium Technology. *Nuclear Technology Briefs—Reactor Materials,* Mar. 19, 1958, p. 2-9.
22 ref. (T11, 17-57; Cb)

296-T. Plutonium—a Reactor Fuel. *Nuclear Technology Briefs—Reactor Materials,* Mar. 19, 1958, p. 10-14.
(T11g, 17-57; Pu)

297-T. Use of Materials at Temperatures up to 2000° F. Harry A. Pearl. *Society of Automotive Engineers, Preprint,* v. 46B, Apr. 1958, 18 p.
(T24, 17-51; SGA-h)

298-T. Aluminum for the Dairy Industry. J. C. Bailey. *Society of Dairy Technology, Journal,* v. 11, Apr. 1958, p. 50-58.
10 ref. (T3s, 17-57; Al-b)

299-T. Stainless Steels: Their Uses and Maintenance in the Dairy. G. H. Botham and J. R. Cuttell. *Society of Dairy Technology, Journal,* v. 11, Apr. 1958, p. 59-66.
(T3s, 17-57; SS)

300-T.* Head-End Processes for Dissolving Stainless Steel. UO_2 Dispersion-Type Fuel Elements. F. S. Martin and M. J. Waterman. *United Kingdom Atomic Energy Authority,* AERE C/R 2454, 1958, 13 p.
Two methods have been devised: treatment with methane, ammonia or sodium cyanide at high temperatures to introduce carbon or nitrogen into the steel and thus alter its characteristic structure; and by making the steel element a consumable anode in a nitric acid electrolytic bath. (T11g, 17-57; SS)

301-T.* Some Studies of the Reaction Between Sodium and Bismuth. R. I. Haes. *United Kingdom Atomic Energy Authority,* AERE R/M 138, 1957, 11 p.
In a circulating fuel, liquid-metal-fueled reactor, a secondary liquid metal coolant circuit is likely to be used. Use of a solution of uranium in bismuth as a fuel and sodium as a secondary coolant. An exothermic reaction occurs between Na and Bi leading to a high-melting point intermetallic compound.
(T11g, 17-57; U, Bi, Na)

302-T.* AISI and Stainless Steels for Aerodynamic Applications. J. T. Milek and B. L. Molander. Paper from "Metals for Supersonic Aircraft and Missiles", American Society for Metals, p. 217-233.
AISI steels are not normally considered for aerodynamic applications as such, but are utilized as supporting members in applications such as landing gear and wing attach fittings. Stainless steels are used in basic applications such as wing skins. Alloys used include precipitation hardening types 17-7 and 17-4, 19-9 DX, Type 302. in the cold worked condition and types 310 and 312 when excessive temperatures are encountered. 6 ref. (T24, 17-57; SS)

303-T. (German.) **Sintered Bimetallic Bearings.** W. W. Saklinski. *Maschinenbau Technik,* Nov. 1957, p. 577-580.
(T7d, 17-57, H15)

304-T. (German.) **Formation of Cutting Tool Bits.** Kurt R. Pawlowitz. *Technik und Betrieb,* v. 10, Apr. 1958, p. 41-42.
(T6n)

305-T. (German.) **Light Metals as Structural Materials for the Transportation and Communication Industry.** Heinz Anders. *Verkehr und Technik,* v. 11, Apr. 1958, p. 89-90.
6 ref. (T-general, 17-57, 18-51, 18-52; EG-a39)

306-T. (Rumanian.) **A Study of Porous Iron Bearings With Improved Wear Properties.** G. Dan, O. Stefan and A. Protopopescu. *Studii si Cercetari de Metalurgie,* v. 2, no. 4, 1957, p. 465-481.
On the basis of tests it is concluded that it is possible to obtain from oxide powders material which has a resistance to wear comparable with that of material from electrolytic iron powders. 5 ref.
(T7d, 17-57, Q9n; Fe, 6-71)

307-T. (Rumanian.) **Strontium-Containing Metallurgical Cements.** A. Branski. *Studii si Cercetari de Metalurgie,* v. 2, no. 4, 1957, p. 545-551.
New alkaline earth cements in the form of strontium metallurgical cements were obtained from ordinary basic slag (of calcium) and cement clinker containing strontium (silicate cement based on $3SrO.SiO_2$). These were found to be better for marine construction than portland, aluminum and calcium cements up

to now used for marine construction. 5 ref. (T22, 17-57, A11d; NM-f43, RM-q, *Sr*)

308-T. (Russian.) **Rational Design of Rail Grooves.** B. S. Shapiro. *Stal'*, v. 18, Mar. 1958, p. 227-230.
6 ref. (T23q, 17-51)

309-T. (Book.) **Fuel Elements Conference.** Book 1, 811 p. 1958. U. S. Office of Technical Services, T1D-7546, Washington 25, D. C. $7.

Conference under joint sponsorship of the U. S. Atomic Energy Committee and French Commissariat a l'Energie Atomique (CEA). Fuel element fabrication practices and behavior of fuel elements under in-pile irradiation and when subjected to corrosive media. Papers abstracted separately. (T11g)

310-T.* **Corrosion Behavior of Aluminum in the Construction Industry.** J. F. Whiting and H. P. Godard. *Engineering Journal*, v. 41, June 1958, p. 45-54.

Influence of environmental factors on performance of Al alloys. 21 ref. (T26; Al-b)

311-T.* **New Metals in the Oil Industry. Pt. 1. Titanium and Zirconium, Tantalum and Niobium.** W. H. L. Hooper. *Petroleum*, v. 21, July 1958, p. 219-224.

Characteristics of Ti and Zr from viewpoint of petroleum equipment manufacturers.
(T29n; Ti-b, Zr-b, Ta, Cb)

312-T. The Re-Servicing of Carbide Tools. *Australasian Manufacturer*, v. 43, June 7, 1958, p. 44-45, 48, 50-51, 60-62, 65.
(T6n)

313-T.* **Out-of-Pile Dynamic Loop Tests of Irradiated Fuel Materials.** L. A. Waldman and W. T. Lindsay. *Bettis Technical Review*, WAPD-BI-7, Mar. 1958, p. 1-15.

An extended series of dynamic tests of clad and defected pre-irradiated specimens of U-Mo alloy and UO_2 fuel materials carried out in out-of-pile loops. The tests contrasted the major difference in the behavior of alloy and oxide fuel material during failure of fuel elements. Results demonstrated considerable stability of the UO_2 specimens and showed that long-lived fission products are not easily leached from either high or relatively low density UO_2. (T11g; U, Mo)

314-T.* **The Use of Titanium as a Corrosion Resistant Material in Chemical Engineering.** *Corrosion Prevention and Control*, v. 5, June 1958, p. 37-39.

Used for gas/water nozzles handling sea-water saturated with SO_2 and operating in hot gas containing SO_2, titanium was untouched after 15 months' service, as compared with the short life of silicon-iron. Where Ti has replaced low-alloy and stainless steels for making certain gas compressor valve plates and springs, no failure has so far occurred after more than 18 months' continuous service. Other Ti components in service include thermo-pockets, stirrers, heating and cooling coils, wire meshes and filter plates and pump impellers. (T29, R4b, R7k; Ti-b)

315-T. Joint Design for Titanium Missile Applications. Pt. 2. B. L. Baird and C. W. Handova. *Industry and Welding*, v. 31, Mar. 1958, p. 56-58.
(Conclusion.)
(T24e, K1a, 17-51; Ti-b)

316-T. Current Experimental Work With Sintered Oxide as a Cutting Tool. H. Eckersley and R. N. Cook. *Institution of Production Engineers, Journal*, v. 37, June 1958, p. 341-362.

Analysis of American, European and Russian progress. Sintered oxides are compared with carbides in various applications. 16 ref.
(T6n; SGA-j)

317-T. Titanium in Chemical Plant. *Light Metals*, v. 21, June 1958, p. 180-181.
(T29; Ti-b)

318-T. Road Tankers in Aluminum. *Light Metals*, v. 21, June 1958, p. 184-185.
(T21a; M-b)

319-T. High-Strength Structural Sandwich Construction. W. E. Dirkes. Digest from "ASME Design Engineering Conference Paper 58-MD-10", *Mechanical Engineering*, v. 80, July 1958, p. 72-73.

Principal benefit of sandwich construction gives a greater section modulus per unit of density than a conventional beam or panel of solid material. Also, maximum moment developed is resisted by high tensile stress and high compressive stress in the faces.
(T-general; 7-59)

320-T.* **Metallurgical Factors in the Design of Hydraulic Equipment for Elevated Temperature Application.** A. Mars and N. M. Lazar. Digest from "ASME-ARS Joint Aviation Con-

ference Paper 58-AV-11", *Mechanical Engineering*, v. 80, July 1958, p. 75.

Factors controlling the use of metals in the temperature range 400 to 900° F. For high stressed and wear parts, toolsteel-grade steels show promise. Cast irons show satisfactory structural stability in the temperature range for some wear applications and for structural parts and bodies. Nonferrous alloys must be selected with great care, since the temperature range of their usefulness is limited.
(T4c, Q-general, 2-62, 17-51)

321-T. Niobium in Aircraft Gas Turbines. *Metal Industry*, v. 92, June 27, 1958, p. 527-528.

(T24b; Cb, SGA-h)

322-T. Plastics Impregnated Sintered Bronze. *Metal Industry*, v. 92, June 27, 1958, p. 529.

Porous sintered bronze bearings, impregnated with polytetrafluoroethylene, have advantages where bearings must operate for long periods without replenishment of lubricant, and where oil or grease may be objectionable or unable to withstand relatively high temperatures. Bearings of this type, designated "Polyslip," now being made by Bound Brook Bearings Ltd., have a porous bronze matrix impregnated with polytetrafluoro-ethylene and have a superficial layer of polytetrafluoro-ethylene on the bearing surface. (T7d; SGA-c)

323-T. Aluminum Engines—Design for Modern Fabrication. James M. Smith and Richard M. Smith. *Society for Automotive Engineers, Preprint* 68A, 1958, 25 p.

Suggests approach to problems of Al engine design. (T21b, 17-51; Al-b)

324-T. Stainless Toilet Ball Cock New Design Concept. *Western Metalworking*, v. 16, Mar. 1958, p. 23-26.

(T10k, 17-21, 17-27, SS)

325-T. (German.) **Recent Development of High-Temperature and Corrosion Resistant Materials.** F. Skaupy. *Fertigungstechnik*, v. 8, Apr. 1958, p. 161-163.

Different types of materials developed for resisting high temperatures and corrosion. (T-general, R-general, 2-62, SGA-g, SGA-L)

326-T.* (French.) **Work in France on Production and Study of Large-Size Fittings in Titanium Alloy.** El Gammal. *N. A. T. O. Consulting Commission on Aircraft Research and Manufacture, Report* 97, Apr. 1957, 44 p.

Production and design studies carried out on "piano" wing fittings of SO 4050 Vautoir II. Tests on cut-out sections provided data on usual tensile properties and their variation at low temperatures, fatigue strength, effect of stress-relieving heat treatment, strength of notched test pieces under constant load. Although mechanical properties still need improvement, it appears possible to use Ti alloy fittings on transonic aircraft.
(T24a, 17-57, Q-general; Ti-b)

327-T. Ceramic Tooling. *Aircraft Production*, v. 20, July 1958, p. 274-282.

Use of ceramic cutting tips in commercial practice results in savings over conventional methods.
(T6n; SGA-5, 6-70)

328-T. The Behavior of Sliding Bearings. R. A. Langdon. *Tooling and Production*, v. 24, July 1958, p. 38-41.

Slide designs should be restudied in light of our present knowledge of materials and slide mechanics. Higher cost of newer materials can be offset by reduction of machining time required to prepare them and by the fact that wear and consequent replacement of costly parts is reduced. (T7d, Q9)

329-T. Investigation of Chromium-Manganese Austenitic Steels. A. S. Panicheva. *Metallovedenie i Obrabotka Metallov*, May 1958, p. 23-27. (Henry Brutcher, Altadena, Calif., Translation no. 4219.)

Study to determine usefulness of Cr-Mn austenitic steels for bolts in superheated steam installations. Steel No. EI 729 meets the requirements of high yield point, heat resistance and satisfactory machinability. After 1000 hr. aging at 550-650° C., its shock resistance is stabilized at 4.5 kg. per sq. cm. 10 ref. (T7f, Q-general, 261; SS)

330-T. (French.) **Utilization of Light Alloys in the Building Industry.** R. Gauvry. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 203-210.

Properties of Al and its alloys, particularly resistance to corrosion by atmospheric agents, and the characteristics of light alloys which are important in building construction. Use for various parts of buildings. (T26n, 17-57; Al-b)

331-T. (French.) **Galvanized Steel in Buildings and Public Works.** J. R. Rouff. *Corrosion et Anticorrosion*, v. 6, June 1958, p. 211-216.

Characteristics of Zn coatings, their mode of protection, perform-

ance and general outlook of the possible application of galvanized steel in building and public works construction.
(T26n, 17-57; L16; ST, *Zn*)

332-T. (French.) **Lead in the Building Industry.** Jean Chauvin. *Corrosion et Anticorrosion,* v. 6, June 1958, p. 223-228.

Water tightness, malleability, soldering ease, high density, chemical stability, etc., that favor use of Pb in building construction in form of laminated sheets or pipes. Sound insulating properties; application in nuclear installations for protection against radioactivity.
(T26n, T11, 17-57; Pb)

333-T.* (French.) **Steels for Welded Structures and Pressure Vessels.** G. P. Smedley. *Revue de Metallurgie,* v. 55, Apr. 1958, p. 323-332.

Requirements of routine test to determine notch toughness of some types of steel suitable for welded construction; influence of stress during service, operating temperature (in case of pressure vessels), construction conditions, residual stress, stress-relieving heat treatment, quality of workmanship. 22 ref. (T26q, 17-57, Q-general; ST, 7-51)

334-T. (German.) **Hard Metal Tools for Coal Mining.** K. Jaeger. *Bergbautechnik,* Jan. 1958, p. 24-27.

Application of carbide-tipped tools for drilling in mines.
(T28j, 17-57; 6-69)

335-T. (German.) **Tantalum for Chemical Equipment.** Herbert Meyll and Hermann Speidel. *Chemie-Ingenieur-Technik,* May 1958, p. 337-340.

(T29, 17-57; Ta)

336-T. (German.) **Aluminum Paste.** J. K. Hartmann. *Farbe und Lack,* Feb. 1958, p. 77-78.

Dust-free Al pigment.
(T29c, 17-57; Al)

337-T.* (German.) **Materials for Nuclear Reactors.** H. Lachner. *Metall,* v. 12, May 1958, p. 387-395.

Survey of various reactor materials and their properties under severe heat conditions. Besides metallic fuel elements, sintered ceramic elements from carbides, borides, silicides and nitrides proved very promising because of their heat conducting properties and strength under elevated temperatures.
(T11, 17-57)

338-T. (German.) **Sea Water Resistant Winch in Light Alloy.** H. Heinemann. *Schweissen und Schneiden,* v. 10, June 1958, p. 226-227.

Inert gas welding in construction of ship's superstructures of Al.
(T22j, K1d; Al)

339-T. (German.) **Modern Turntable in Hollow Box Construction for Railway Engines.** Ernest Schellhöh. *Schweissen und Schneiden,* v. 10, June 1958, p. 233-237.

Fully welded turntable has proved successful. (T23q, K-general)

340-T. (German.) **Gas Welded Portable Halls Made of Light Alloys.** H. H. Grix. *Schweissen und Schneiden,* v. 10, June 1958, p. 241-242.

Gas welded and brazed structures from Al-Mg-Si alloys.
(T26n, K2, K8; Al, Mg, Si)

341-T. (German.) **Packing Foils.** *Seifen, Oele, Fette, Wachse,* Mar. 5, 1958, p. 123-124.

Symposium covering synthetic foils, Al foils, coated materials, welding of foils, adhesive joining, automatic manufacture, printing on foils, durability of packing foils.
(T10g, 4-66)

342-T. (German.) **Production of Taper-Shank Reamers.** Rohner. *Technica,* Jan. 17, 1958, p. 63-65.

(T6n)

343-T. (German.) **Bearings and Bushings of Sintered Metal.** *Technik und Betrieb,* Feb. 1958, p. 27-29.

(T7d, 17-57; 6-72)

344-T. (German.) **Circular Blades for Cold Sawing Machines.** *Technik und Betrieb,* Mar. 1958, p. 39.

(T6n)

345-T. (German.) **Cast Steel and Malleable Iron in Light Construction.** Karl Roesch. *VDI-Berichte,* v. 28, 1958, p. 43-48.

(T-general, 17-57; CI-s, ST)

346-T. (German.) **Nodular Cast Iron Gearwheels.** G. Niemann and H. Rettig. *VDI-Berichte,* v. 27, 1958, p. 39-46.

Application in load range of hardened and unhardened gearwheels. 5 ref. (T7a, 17-57; CI-r)

347-T. (German.) **Cast Crankshafts.** K. Bandow. *VDI-Berichte,* v. 27, 1958, p. 47-53.

(T21c; CI)

348-T. (German.) **Light Metals and Light Construction.** Gustav Guertler. *VDI-Berichte,* v. 28, 1958, p. 49-57.

42 ref. (T-general, Q-general, 17-57; Al, Mg)

349-T. (German.) **Examples of Applications of Nodular Cast Iron.** H. Muehlberger. *VDI-Berichte,* v. 27, 1958, p. 55-59.

(T-general, 17-57; CI-r)

350-T. (German.) **Theory of Friction Bearing Lubrication.** Heinrich Ebeling. *VDI-Zeitschrift,* v. 100, Jan. 11, 1958, p. 46-47.

(T7d, 18-73)

351-T. Tool Up for High-Speed Cutting. Pt. 2. W. G. McIntosh. *Canadian Metalworking,* v. 21, June 1958, p. 22-23.

Potential of ceramic cutting tools. (T6n; SGA-j, 6-70)

352-T. Percussion Drill Steel Facts of Life. *Engineering and Mining Journal,* v. 159, Mid-June 1958, p. 110-113.

Mechanism of failure in drill steel. (T28j; Q-general; ST)

353-T. Chemical Plant in Titanium. R. J. Watkins. *Industrial Chemist,* v. 34, June 1958, p. 282-286.

8 ref. (T29, 17-57; Ti)

354-T. Sinter Alumina for Cutting Tools. Felix Singer and Sonja S. Singer. *Interceram,* no. 6, 1957, p. 22-25.

11 ref. (T6n, 17-57; SGA-j, 6-70, Al)

355-T. Recent Structural Aluminum Developments in Belgium. H. R. Craggs. *Light Metals,* v. 21, July 1958, p. 213-218.

(T26, 17-57; Al-b)

356-T. Corrugated Metallic Cable Sheath. K. Andresen, F. Dias and N. D. Kenney. *Power Apparatus and Systems,* no. 36, June 1958, p. 169-180.

Steel sheath manufacturing techniques; corrosion resistance and mechanical properties. (T1b, 17-57; ST)

357-T. New Spring With Restricted Coil Diameter Carries Higher Load. *Western Metalworking,* v. 16, July 1958, p. 49-50.

(T7c)

358-T. (French.) **Boiler Tanks.** J. Theodore. *Soudage et Techniques Connexes,* v. 12, May-June 1958, p. 211-216.

Fabrication of boiler tanks; steel used, acceptance tests carried out on plates, forming, welding, preheating and heat treatments, inspection of welds. (T26q, K-general; ST)

359-T. (German.) **Properties of Ageable Lead Bearing Metals and Their Application in Railroad Cars.** B. Beyer and H. Seliger. *Deutsche Eisenbahntechnik,* v. 6, May 1958, p. 215-219.

23 ref.
(T7d, T23p, 17-57; Pb *Ba, Mg*)

360-T. (German.) **Oxide-Ceramic Cutting Material.** F. Pühler and R. Wagner. *Industrie-Anzeiger,* v. 80, June 13, 1958, p. 673-676.

(T6n; SGA-j, 6-70)

361-T. (German.) **Electrodes for Spark Erosion Die Machining.** H. Obrig. *Industrie-Anzeiger,* v. 80, June 13, 1958, p. 685-688.

(T1f, G24a)

362-T. (German.) **Structure and Tool Life of Ceramic Cutting Tools.** R. Fleck and M. Gappich. *Industrie-Anzeiger,* v. 80, June 13, 1958, p. 689-692.

7 ref. (T6n; SGA-j, 6-70)

363-T. (German.) **Flame Sprayed Friction Bearings.** H. D. Steffens. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 719-722.

Economic and technical advantages of metal sprayed friction bearings; choice of metal; production techniques; tests and their results. 3 ref. (T7d, L23)

364-T.* (French.) **Use of Structural Elements Made From Rolled Sheets.** Cedric Marsh. *Revue de l'Aluminium,* v. 35, May 1958 p. 523-531.

Method for calculating rupture stresses. Fabrication processes of circular and rectangular tubes. How to eliminate local buckling that develops from riveting, fastening and welding of structural elements. (T26n, T26p, Q25; Al-b, 4-53, 7-51)

365-T. Cemented Carbide Turning Tools. A. G. Gardner. *Mechanical World and Engineering Record,* July 1958, p. 308-313.

Recommendations on mounting of tool tips, side and edge rake, chip breakers, cutting speed, feed, depth of cut, coolants and wheel grinding. (T6n, 6-69)

366-T. (French.) **Alkali Batteries With Sintered Plates.** D. Stanimirovitch. *Revue du Nickel,* v. 24, Apr-May-June 1958, p. 39-46.

Nickel-cadmium batteries are produced by a method involving the sintering of Ni powder to create a highly porous surface, and the impregnation of this surface with cadmium hydrate for the negative electrode and nickel hydrate for the positive electrode. (T1; Ni, Cd, 6-71)

367-T. (German.) **Material Problems in the Construction of Reactors.** F.

Lihl. *Radex-Rundschau,* no. 1, Feb. 1957, p. 482-494.

28 ref. (T11)

368-T. (Russian.) **Effect of Heat Treatment on Chemical Composition of Steels Used for Transformers and Other Electrical Equipment.** G. N. Shubin. *Stal',* June 1958, p. 559-560.

(T1j, ST, Si, 2-60, 2-64)

369-T.* **Fuel Elements.** *Power Reactor Technology,* v. 1, June 1958, p. 24-36.

Development in field of reactor fuels; data on nuclear performance, mechanical properties, corrosion resistance, irradiation damage and dimensional change with irradiation for fuels including natural uranium, U-Zr, U-Mo, U-Nb, Pu-Al, Pu-U dioxide, Th-U oxide, U-Al. 48 ref.
(T11g, U, Mo, Zr, Nb, Al, Pu, Th)

370-T.* **What the Aircraft Maker Wants in a Steel Casting.** L. H. McCreery. *Metal Progress,* v. 74, July 1958, p. 71-75.

The logical solution to many problems facing the manufacturer of advanced aircraft and missiles is the use of high-integrity, close-tolerance steel castings. They can be heat treated to strength levels of 180,000 psi. or more and require little or no machining.
(T24a, 17-57, E-general; ST)

371-T.* **A Lesson in Fabricating Nuclear Parts.** *Metal Progress,* v. 74, Aug. 1958, p. 68-74.

Fabricated reactor components are produced from Zr alloys and Hf using metalworking techniques developed for precision and to avoid contamination. Welding is in a dry box, heat treating is in a vacuum; forming is done hot. Surface treatment and testing methods are also special. (T11, G-general, J-general, K-general; Zr, Hf)

372-T. **Retainer Materials for Aircraft Gas Turbine Bearings.** E. J. Bucur, F. C. Wagner and J. T. Burwell, Jr. Horizons Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131349, Mar. 1955, 52 p. $1.50.

Alloys developed for use as retainers in rolling contact bearings. Addition of from 2 to 4% Si was found to be beneficial.
(T7d, 17-57; AD-q, Si, Ag)

373-T. **Improved P.T.F.E. Impregnated Bronze Dry Bearing.** *Australasian Manufacturer,* v. 43, July 5, 1958, p. 44-46, 48-55.

New bearing consists of a steel backing to which there is sintered a spherical bronze powder impregnated with a mixture of polytetrafluoro-ethylene and lead.
(T7d; 17-57; SGA-c, Cu-s)

374-T. **Materials Progress: Metals.** Irwin Stambler. *Aviation Age,* v. 30, Aug. 1958, p. 54-61.

Aircraft applications of new high-strength steels; Ti, Ni-base alloys, Co-base alloys, Be, Mo, Cb, Ta, W, Cr, V, Zr and Rh. (T24; ST, Ti, Ni, Co, Be, Mo, Cb, Ta, W, Cr, V, Zr, Rh, 17-57)

375-T. **M. V. Sumter—First All-Aluminum Tug.** Carl W. Leveau. *Marine Engineering Log,* July 1958, p. 73-75.

Corrosion resistant, high-strength weldable alloys 5083 and 5086, developed by Kaiser Aluminum used for 55-ft. 460-hp. boat.
(T22, 17-57; Al-b)

376-T. **Printed Circuits.** Andre Roos. *Metal Industry,* v. 92, June 6, 1958, p. 467-470.

Processes in manufacturing printed circuits. Characteristics of Cu sheets, bonding Cu to plastic panel, etching.
(T1c, X15, 17-57; Cu, 4-53)

377-T. **Materials for a Space Traveller.** Rodney A. Jones. *Metal Progress,* v. 74, July 1958, p. 78-82.

How will constructional materials and instrumentation for space vehicles be affected by very high vacuum, solar radiation, cosmic rays, ionized atoms, meteorite dust, zero gravity? (T24f, 17-57)

378-T. **Swedes Make Modern Bearings.** A. E. Olsson. *Metal Progress,* v. 74, Aug. 1958, p. 91-93.

Electrolytic salt bath cleaning and centrifugal casting together can produce strong, long-lived bearings. A well-known European manufacturer of heavy equipment is having great success with this combination.
(T7d, L12n, E14; CI, Sn, Pb)

379-T. **Smiths' Semi-Automatic Thermostat Line.** T. E. W. Preston. *Metalworking Production,* June 13, 1958, p. 1027-1031.

Layout of thermostat production plant with new machinery and methods has resulted in 20% increase in output and operational accuracy of 1° C. (T21c, W25, 18-67)

380-T. The Metallurgical Contribution to Economic Nuclear Power. Alex B. McIntosh. *Royal College of Science and Technology, Metallurgical Club, Journal,* no. 10, 1957-1958, p. 13-23.

6 ref. (T11, 17-57)

381-T. Buildings Cast in Iron. F Evans. *British Steelmaker,* v. 24, June 1958, p. 178-179.

(T26n, 17-57, A2; CI)

382-T. Tinfoil in Condenser Manufacture. *Tin and Its Uses,* no. 42, Spring 1958, p. 1-3.

(T1e, 17-57; Sn, 4-56)

383-T. (French.) "Dauphine" Production Methods at Renault. Pt. 10. *Machine Moderne,* v. 52, June 1958, p. 25-30.

Automatic assembly, welding and spray painting of bodies at Billancourt and Flins plants.
(T24, K-general, L26n, 18-67)

384-T. Materials for Ballistic Rockets. V. Parfenov. *Sovietskaya Aviatsiya,* no. 277, Nov. 24, 1957, p. 3. (Henry Brutcher, Altadena, Calif., Translation no. 4208.)

General survey of conditions encountered by rockets. High-melting and heat-resisting metals suitable for radomes and radome coatings; materials for fuel and oxidant storage; Ta as lining material for nitric acid tanks. (T24e, 17-57, SGA-h)

385-T. Summary of Development and Evaluation of Insulating-Type Refractory Coatings. S. Sklarew, C. A. Hauck and A. V. Levy. Marquardt Aircraft Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 121759, Oct. 1956, 96 p. $3.75.

Coatings to provide thermal insulation to aircraft and missile structural members operating in the 2000 to 3000° F. range. Reinforced refractories 0.080 to 0.15 in. thick providing thermal drops of 5 to 10° F. per 0.001 in. of thickness were successfully tested on a small scale. (T24b, 17-57; RM-h40, 8-71)

386-T.* (Italian.) Molybdenum as a Heating Element for Electric Resistance Furnaces. O. Dorigo. *Elettrotecnica,* v. 45, Apr. 25, 1958, p. 229-232.

Physical properties of Mo; use as heating element in industrial furnaces, particularly those used in sintering of Fe powders and manufacture of cermets. Behavior of Mo in prepared atmospheres. 10 ref. (T1f, W26e, 17-57; Mo)

387-T. The Importance of Platinum in Petroleum Refining. Claude C. Peavy. *Platinum Metals Review,* v. 2, Apr. 1958, p. 48-52.

Platinum catalyst refining of low-octane straightrun naptha fractions of the crude to extremely high-octane levels is the most likely process used in producing fuels for modern aircraft and automobile engines. Process is versatile and produces profitable byproducts. 6 ref. (T29d, T29n, 17-57; Pt)

388-T. (French.) Lightness in Welded Construction Steel Assemblies Combining Welded and Mechanical Joints. A. Ogus. *Revue de la Mecanique,* v. 109, Mar. 1958, p. 175-177.

(T26; ST, 7-51)

389-T. (Hungarian.) Use of Blast Furnace Slags in Agriculture. Istvan Palfalvi. *Kohaszati Lapok,* v. 91, Apr. 1958, p. 196-200.

Silica content improves texture of loose sandy soils. Manganese content is helpful in Mn-deficient soils. 26 ref.
(T3p, 17-57; Fe, RM-q)

390-T. Found—a Low-Alloy Steel for Missiles. William M. Stocker, Jr. *American Machinist,* v. 102, Aug. 25, 1958, p. 72-73.

U. S. Steel Corp.'s Airsteel X-200, developed to solve missile manufacturing problems, is as workable as AISI 4340 and air hardenable to 280,000-psi tensile strength. (T24e, 17-57, Q27a; AY)

391-T. (French.) Copper Through the Ages. Roger Vaultier. *Cuivre Laitons Alliages,* no. 43, May-June 1958, p. 24-26.

Decorative pieces of Cu and Cu and Ag of the 13th and 14th centuries. (To be continued.)
(T9q, 17-57, A2; Cu, Ag)

392-T. (French.) Metallurgical Problems of Nuclear Reactors. Structural Materials. Jean Bernard. *Energie Nucleaire,* v. 2, Apr-June 1958, p. 73-97.

5 ref. (T11, 17-57)

393-T. (French.) Aluminum in the Atomic Pile at Centre de Saclay. Louis Badin, Pierre Coutou and Maurice Victor. *Revue de l'Aluminium,* no. 255, June 1958, p. 644-650.

(T11q, T26q, 17-57; Al-b)

394-T. (French.) **Casting of "55" Air-brake Distributor.** Andre Chevrier. *Revue de l'Aluminium,* no. 255, June 1958, p. 663-668.

Complexity of Westinghouse compressed air brake distributor requires high accuracy in casting and assembling. (T23s, E11, Al, 5-60)

395-T. (Polish.) **Steel-Aluminum Trolley Wires for Transportation Systems.** Leszek Godecki. *Hutnik,* v. 23. Sept. 1956, p. 340-343.

Previously abstracted from original. See item 11-T, 1957.
(T1, 17-57; Al, ST)

396-T. (German-French.) **Durable Thread Inserts for Light Metal.** *Aluminium Suisse,* v. 8, no. 2, Mar. 1958, p. 67-68.

Uses of "Heli-Coil" Cr-Ni steel threading inserts. (T7f; AY, *Cr, Ni*)

397-T. (Book.) **Lubrication of Bearings.** F. T. Barwell. 292 p. 1956 Butterworths Scientific Publications. 88 Kingsway W.C. 2, London.

Modes of lubrication, wear and its mechanisms, viscosity, principles of hydrodynamic lubrication, journal bearings subject to variable loading, thrust bearings, concentrated contact bearings, externally pressurized bearings, reciprocating sliders and oscillating bearings.
(T7d, 18-73; NM-h)

398-T. (Book.) **Nuclear Reactor Metallurgy.** Walter D. Wilkinson and William F. Murphy. 382 p. 1958. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. $5.60.

Introduction for engineers and students. Covers production of uranium metal from ores; structure and properties of U; U alloys; heat treatment, fabrication, powder metallurgy, corrosion, surface protection of U; metallurgy of Pu, Th, Be, Zr; properties of liquid metals and ceramics; effects of neutron radiation on nonfissionable metals and alloys; nondestructive testing of reactor components.
(T1l, 17-57; Be, Pu, Th, Zr, 17-67)

399-T. Steel Castings in Airframes. John K. Dietz. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 17-20.

Most feasible method of fabricating a complex shape is to cast it to its final configuration. Yet extended application of castings is being hampered by difficulties currently being encountered. These include low and nonuniform tensile properties; dimensional problems; defects in critical areas; slow delivery. Optimum techniques are recommended. (T24a, 17-57; ST, 5-60)

400-T. Materials for Hypersonic Weapons. J. J. Russ. Paper from "High Strength Steels for Aircraft", American Society for Metals, 1958, p. 31-40.

High-temperature properties of 50 special alloys. Forgeability index numbers, maximum tensile strength, tempering and aging temperatures and maximum usable temperatures are tabulated.
(T24, 17-57, F22, Q-general, 2-62, 17-52)

401-T.* (German.) **Further Development of Lead-Magnesium Bearing Metals.** Hellmuth Seliger. *Freiberger Forschungshefte,* no. B28, 1958, p. 5-20.

Effect of Mg on Pb-bearing alloys. New alloy is superior to known Sn-Pb bearing metals; has greater smoothness, corrosion and heat resistance. Hardening constituents (chiefly Ca and Na) are added to Mg-Pb alloy by electrolytic deposition; properties are improved by heat treatment. (T7d, 17-57; Pb, *Mg*)

402-T. Structural and Vibrational Characteristics of WADC X-1, X-2 and X-3 Model Propeller Blades. J. E. Carpenter, F. W. Stutzman and E. M. Sullivan. Cornell Aeronautical Laboratory, Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131239, Jan. 1957, 181 p. $4.75.

Propellers are 5-ft. diameter, three-bladed configurations designed for use in supersonic aircraft. Special test equipment was modified to include a camera installation for photographing the blade tip during rotation. Experimental data included the steady strain distribution at rotational speeds to 5800 rpm. produced by centrifugal force, blade natural frequencies, changes in blade tip pitch angle with rotation, vibratory strain distributions, and blade damping characteristics. Blade vibratory characteristics, in both bending and torsion, were analytically determined. (T24, S21)

403-T. Structural and Vibrational Characteristics of Scale Model Supersonic Propeller Blades. M. O. Burquest and J. E. Carpenter. Cornell Aeronautical Laboratory, Inc. (Wright Air Development Center.) *U. S. Of-*

fice of Technical Services, PB 131426, Aug. 1956, 70 p. $2.

Test blades as large as 8 ft. in diameter are instrumented with wire resistance strain gages and rotated in a steel shell evacuated to less than 1% of atmospheric pressure. Test data are obtained at rotational speeds up to 8000 rpm. at any positive or negative blade angle setting. Excellent correlation was obtained between the experimental and analytical results.
(T24, S21)

404-T.* (Japanese.) **Atomic Power and Metals: Beryllium and Its Oxide.** Hiroshi Makatani. *Metals,* v. 28, July 1958, p. 505-507.

Be has remarkable characteristics which are desirable for an atomic pile; small mass, mechanical strength, stability under collision with high energy neutrons, durability, large scattering cross section. Chemical, physical and mechanical properties, deposits in Japanese extraction and refining.
(T11, 17-57, P18; Be)

405-T. Metallurgical Problems in Molten Fluoride Systems. W. D. Manly, J. H. Coobs, J. H. DeVan, D. A. Douglas, H. Inouye, P. Patriarca, T. K. Roche and J. L. Scott. *Second United Nations International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.15/P/1990, U. S. A., June 1958, 30 p.

Use of nickel-base alloys and austenitic stainless steel as construction materials for containing molten fluorides. 7 ref.
(T11, 17-57; Ni-b, SS-e)

406-T. Tool Engineering for the Space Age. T. W. Black. *Tool Engineer,* v. 41, Sept. 1958, p. 73-82.

Space age problems in the aircraft and missile industry and how they are being solved by creative engineering. (T24, G-general)

407-T. A Guide to Nuclear Power. Pt. 3. Metallurgical Problems. W. D. Biggs. *Welder,* v. 27, no. 134, Apr-June 1958, p. 26-29.

Physical properties and types of metals used in construction of various reactor components. Present trend suggests increase in thickness of pressure shell and the use of exotic materials in construction. (To be continued.)
(T11q, K1a, 17-57; SS-e, Cr, Ni)

408-T. Welding Applications at Derby C. & W. Works. Pt. 2. A. E. Bates. *Welder,* v. 27, no. 134, Apr-June 1958, p. 30-34.

Railroad car manufacturer finds welding, where practicable and possible, economical and a very efficient means of fabrication.
(T23p, K1a; ST-b)

409-T. (French.) **Metals for Thermal Reactors.** Marcel Englander. *Mines,* v. 13, no. 2, 1958, p. 167-171.

(T11, 17-57)

410-T. (Italian.) **Selection of Materials for Oil Refining Plants.** *Nickel,* no. 74. June 1958, p. 1-10.

(T29n, R-general, 17-57; Cu-b, Ni-f, ST)

411-T. Rocket Refractories. H. B. Porter. Naval Ordnance Test Station. *U. S. Office of Technical Services,* PB 131503, Aug. 1955, 55 p. $1.50.

Basic refractory substances, including metal oxides, metal-metalloid compounds, and intermetallic compounds, both individually and as ingredients of bonded-ceramic and cermet compositions. Use of refractories as protective coatings, combustion chamber liners and nozzles, with special emphasis on commercial materials. Design and fabrication, physical and chemical properties, manufacturers and products.
(T2p, 17-57; 6-70; RM-h, NM-f)

412-T.* (English.) **Production of Enameled Steel Storage Tanks. Construction of a New Plant With a High Degree of Mechanization.** Jan Holub. *Czechoslovak Heavy Industry,* no. 8, 1958, p. 32-38.

Cost and volume analysis of enamelled steel food storage tanks. New automated plant described.
(T26q, W10a, 17-57; ST, 8-71, 18-74)

413-T.* Some Metallurgical Aspects of Pontiac V-8 Engine Pearlitic Malleable Iron Crankshaft. K. B. Valentine. *SAE Transactions,* v. 66, 1958, p. 81-85.

Pearlitic malleable iron is compared with SAE 1046 steel forgings. Modulus of elasticity is less; however, torsional vibration characteristics are similar. Fatigue, hardness and wear properties are satisfactory. Machinability is much better than that of SAE 1046.
(T21b, 17-57, Q-general; CI-s)

414-T.* Problems in the Application of High-Strength Steel Alloys in the Design of Supersonic Aircraft. A. F. Ensrud. *SAE Transactions,* v. 66, 1958, p. 118-136.

Ways to alleviate the intrinsic weight penalties accompanying the use of high-density alloys at ele-

vated temperatures. Primarily, this can be accomplished by the proper selection of materials and the choice of more suitable structural configurations. 16 ref.
(T24, 17-57, 2-62; AY, SGB-a)

415-T.* The Nonnuclear Application of Thorium. W. C. Lilliendahl. Paper from "The Metal Thorium", American Society for Metals, 1958, p. 20-28.

Th metal is utilized as a deoxidant (as for Mo and Fe) and in electronic tubes and lamps for controlling starting voltages and maintaining stability over useful life. An expanding field is the use of Th in W electrodes for heliarc welding where it provides an instant starting arc and arc stability. Th has also found application in the production of sound ductile joints in Mo. 19 ref. (T1j, W29h, 17-57; Th)

416-T. Ways to Keep Fasteners Locked. Federico Strasser. *Iron Age,* v. 182, Sept. 25, 1958, p. 88-91.

(T7f)

417-T. Modern Cutting Tools Save Costs at High and Low Speeds. H. J. Siekman. *Iron Age,* v. 182, Sept. 18, 1958, p. 95-97.

(T6n, 17-57; SGA-j, 6-20, 17-53)

418-T. Foil Clad Laminates in Printed Circuitry. D. K. Rider. *Metal Progress,* v. 74, Sept. 1958, p. 81-85.

Start with an insulating base, glue on very thin Cu foil (free of holes or inclusions) etch away unwanted areas leaving behind conductive paths from point to point. This concept leads to rugged assemblies, mass produced at minimum cost. (T1c; Cu, 4-56)

419-T. Four-Story Welded Frame Designed by the Plastic Theory. M. R. Horne. *Welding and Metal Fabrication,* v. 26, Aug. 1958, p. 278-280.

(T26n; ST, 17-51)

420-T. (Russian.) Role of Iron and Steel Castings in Machine Building. F. Naumann. *Liteinoe Proizvodstvo,* July 1958, p. 30-32.

(T-general, 17-57; CI, ST)

421-T. (Book.) High Strength Steels for Aircraft. 81 p. 1958. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $2.95.

Papers presented at the first Southwestern Metal Congress, Dallas, Tex., May 12-16, 1958. Papers abstracted separately. (T24; ST)

422-T. Motor Industry Extends Use of Anodized Aluminum Trim. *Industrial Finishing (London),* v. 10, Sept. 1958, p. 30-33.

Besides being corrosion resistant, anodized Al can be dyed, and is used for automobile bumpers and trim. (T21, 17-57; Al, 8-73)

423-T.* Sturdy Steels for Springs. *Iron Age,* v. 182, Oct. 16, 1958, p. 186-187.

Performance of a spring is tied to its design and the quality of the steel from which it is made. Spring steels must possess accuracy, ductility, hardenability, finish, high fatigue value and uniformity in response to forming and heat treatment from one lot to another. Tables of standard thickness tolerances, width tolerances for special edges and width tolerances for slit edges. (T7c, 17-57, S22; CN)

424-T.* Designing With Steel for Lighter Aircraft. Bruce Mitchell. *SAE Transactions,* v. 66, 1958, p. 406-413.

One of the better steels for thin sheet applications in light-weight aircraft structure is 17-7PH, because it can be heat treated without scaling. After annealing at 1750° F., it has a yield strength of 45,000 psi. and elongation of 35%. It is transformed at −100° F. after which it has a room-temperature yield strength of 110,000 psi. Final aging treatment is at 950° F. for a room-temperature yield strength of 200,000 psi. and ultimate strength of 240,000 psi. with elongation of 5%. (T24, 17-57, Q27; SS)

425-T.* (French.) Alloys With High Nickel and Chromium Content for Electric Resistances. A. Villachon. *Metallurgie et la Construction Mecanique,* v. 90, Sept. 1958, p. 643-655.

Properties, principal grades, characteristics, methods of test, precautions in use, deterioration, origin of principal impurities, temperature in use, calculation of a heating element, choice of alloys. Wire and strips. 16 ref. (T1p, 17-57; Ni, Cr)

426-T.* (Italian.) Cermets, Ceramics and Protective Coatings for High-Temperature Applications in Jet Propellers. R. M. Corelli. *Aerotecnica,* v. 38, Apr. 1958, p. 71-87.

Production methods, principal characteristics, methods of applica-

tion (in case of coverings), performance. 27 ref.
(T24b, 17-57; SGA-h, 6-70)

427-T. (Czech.) **Welded Edges on Knives for Excavating Equipment for Coal Mines.** Jan Kolar. *Zvaranie,* v. 7, Aug. 1958, p. 234-237.

Experimental use of weld metal with different C, Mn, Si, Cr, W, V, Mo and Co content. Method of welded edges not successful, even when soft and medium hard coal was mined. (T28, 8-68, 17-57)

428-T.* **A Specialist's Way of Making a Way.** O. C. Underhill. *Machinery,* v. 65, Oct. 1958, p. 142-145.

Construction of flat bearings using two different materials to insure accuracy for sliding members in many machine tools. (T7d, W25)

429-T.* (German.) **Can Ceramic Tools Replace Tools of Hard Metal?** F. Kolbl. *Planseeberichte für Pulvermetallurgie,* v. 6, Aug. 1958, p. 48-66.

Ceramics based on aluminum oxide, aluminum oxide with chromium oxide, metals, metal carbides and borides. Properties and cutting speeds. Applications: spinning quartzite and caolinite, cutting hard rubber, lead bronze bearings, plastics, presintered ceramics and gray cast iron. 22 ref. (T6n, 17-57; 6-70)

430-T.* (German.) **Modern Hammer Drills.** O. Muller. *Technische Mitteilungen Krupp,* v. 16, Sept. 1958, p. 66-71.

Weight, number of blows per minute, air pressure, arrangement of water channels. One-piece boring bars and interchangeable boring heads, both with induction welded hard metal bore edges. Sintered tungsten carbide with Co is best. Co content from 7 to 15% determined by hammer type and kind of rock. 8 ref. (T28j; 17-57; 6-69)

431-T. Aluminum Alloys. Ralph L. Horst, Jr. *Industrial and Engineering Chemistry,* v. 50, Sept. 1958, Pt. 2, p. 1427-1432.

New Al-Mg alloys, corrosion, applications in buildings, nuclear reactors, chemical equipment, petroleum refining equipment and transportation equipment. 50 ref. (T-general, R-general, 17-57; Al-b, *Mg*)

432-T. Industrial Material Roller-Bearing Steel and Its Importance for the Production of High-Grade Roller Bearings. A. Naumann. *Technik,* v. 11, no. 11, Nov. 1956, p. 767-772. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1470.)

(T7d, 17-57; ST)

433-T. AF Pushes Beryllium Studies. Jack G. Conner. *Aviation Age,* v. 30, Sept. 1958, p. 102-109.

Pros and cons of Air Force use of Be for missile and spacecraft. (T24e, 17-57; Be)

434-T. Aluminum in Architecture. A. F. Hare. *Modern Metals,* v. 14, Oct. 1958, p. 40, 43, 44, 46, 48, 49.

Applications, ranging from prefabricated homes and schools to huge domes, aircraft hangars and bridges. (T26n, T26p, 17-57; Al-b)

435-T. Uranium. Pt. 1. Case for Enriched Uranium. Chauncey Starr. *Nucleonics,* v. 16, Aug. 1958, p. 86-87.

Prospects for use of enriched U as reactor fuel. 6 ref. (T11g, 17-57; U)

436-T. Uranium. Pt. 2. Case for Natural Uranium. John R. Menke. *Nucleonics,* v. 16, Aug. 1958, p. 88, 95.

Use of natural U as reactor fuel. 12 ref. (T11g, 17-57; U)

437-T. Thorium. Bernard Manowitz. *Nucleonics,* v. 16, Aug. 1958, p. 91-95.

Use of Th as reactor fuel; Th-U^{233} fuel cycle. 12 ref.
(T11g, 17-57; Th, U)

438-T. Ag-In-Cd Could Replace Hf for PWR Control Rods. I. Coehn, E. F. Losco and J. D. Eichenberg. *Nucleonics,* v. 16, Aug. 1958, p. 122-127.

Ag-In-Cd is easily machined, less costly, suitable corrosion resistance. 7 ref. (T11j, 17-57; Ag, In, Cd)

439-T. Fabrications in Nimonic Alloys With Particular Reference to Jet-Engine Components. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 630-635.

(T24b, 17-57; Ni-b)

440-T. Rapid Evaluation of Cutting Tools. L. B. Zylstra. *Tool Engineer,* v. 41, Oct. 1958, p. 117-118.

By using the facing method of testing with an engine lathe it is possible to quickly compare various cutting tools to see if extensive testing is justifiable.
(T6n, G17, 1-54)

441-T. (German.) **Complex Cutting Tools.** E. Bosse. *Fertigungstechnik,* v. 8, Sept. 1958, p. 393-396.

(T6n)

442-T.* (German.) **Wire as Material for Screens.** Erich O. Riedel. *Draht,* v. 9, Aug. 1958, p. 295-301.

Steels suited for screens and their composition. Survey of the effects of alloying elements on the properties of wire and on the resistance against H_2SO_4, HC_2 HNO_3. Wear testing machine illustrated. Excessive deformation of wire or even notching reduces strength up to 50%. Soldering intersections given preference to welding. Welding should be performed always under a protective gas to avoid decarburization. 5 ref. (T10, R6, Q9; ST, 4-61.)

443-T.* (German.) **Precious Metals and Their Alloys as Materials for Electric Contacts.** H. Holzmann. *Metall,* v. 12, July 1958, p. 630-636.

Requirements for electrical contact materials; various materials available (Cu, Ag, Au, Pt, Pd, Rh, In, B, Mo, and their alloys). Physical and electrical properties of the pure metals and a large number of alloys listed, advantages and disadvantages of the materials evaluated. Galvanic coatings discussed. (T1, 17-57; EG-c31, SGA-r)

444-T.* (German.) **Production of Spring Steel Wire for Motorcycle Springs.** Joachin Olden and Karlheinz Werner. *Neue Hütte,* v. 3, June 1958, p. 358-364.

One heat of spring steel of the type MK 82F was followed from melting furnace to actual tests after assembly on the motorcycle. For comparison Swedish spring steel was subjected to similar treatment. Warm forming, drawing tests, cold forming and coiling tests were carried out. German spring steel had same high-quality properties as Swedish steel. (T7c, 17-57; ST)

445-T.* **Development of Micrograin Nickel.** *Corrosion Prevention & Control,* v. 5, Aug. 1958, p. 56-58.

Micrograin Ni is hard, yet flexible and corrosion resistant. Resistance to abrasion and impact is unusually high, better than Ni deposited from solutions containing organic agents, or stainless steel. Advantages of protecting de-icers with micrograin Ni electroform. (T24a, 17-57; Q9n; Ni)

446-T.* **Rudder Shafts for Missiles Made in Halves and Welded.** Russell Meredith. *Machinery,* v. 65, Nov. 1958, p. 118-120.

Inconel "X" selected because it has good physical and mechanical properties at high temperatures and is highly resistant to corrosion and oxidation. Machining procedure is to slab-mill two forgings at a time on a conventional, horizontal milling machine, then contour-milling the various cavities, welding and heat treating. (T24e, G17, K-general; Ni-b)

447-T.* **Reactor Fuels and Materials Pioneering Work on Oxides and the New Metals.** J. G. Ball. *Nuclear Power,* v. 3, Oct. 1958, p. 477-482.

Some 16 of the papers presented at the 2nd United National, International Conference on the Peaceful Uses of Atomic Energy are digested and analyzed. (T11g)

448-T.* **Boron Containing Control Materials.** D. N. Dunning, W. K. Anderson and P. R. Mertens. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 402-414.

Boron stainless steel, Zircaloy-boron and Ti-B alloys for use in reactors. Fabrication techniques. 5 ref. (T11j, 17-57; SS, Zr, Ti, *B*)

449-T.* **Boron Stainless Steel Alloys.** L. B. Prus, E. S. Byron and J. F. Thompson. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 415-428.

Several boron stainless steels containing 0.2 to 3.0% B investigated for possible use as a reactor control material. Fabrication methods, physical properties, wear and corrosion resistance of the alloys. (T11j, 17-57; SS, *B*)

450-T.* **New Developments in the Fabrication of Hafnium Control Rods.** J. Giacobbe and D. N. Dunning. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 467-480.

Fabrication of strip Hf and strip Zircaloy by welding into suitable shapes applicable for reactor control. (T11j, 17-57; K-general, Hf, Zr)

451-T. **Thorium-Uranium Fuel Elements for SRE.** B. R. Hayward and P. Corzine. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/785, 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

One of major purposes of the Sodium Graphite Thermal Reactor Experiment (SRE) is to develop fuel materials for long burnup at elevated temperature. Development, processing and fabrication of Th-rich, Th-U alloys. Two major alloys were fabricated—5.4% U and 7.6% U. 5 ref. (T11g, 17-57; Th-b, *U*)

452-T.* (French.) **Properties and Applications of a Nickel-Sheathed Copper Wire.** *Revue du Nickel,* v. 24, July-Aug. 1958, p. 65-67.

Bimetallic conductor composed of electrolytic Cu coated with Ni combines high electrical and thermal conductivity of Cu with oxidation resistance and metallurgical properties of Ni; is fabricated in all diameters, with cross section 70% Cu, 30% Ni; is delivered hard or annealed. (T1, 17-57; Cu, *Ni,* 4-61)

453-T. Appraisal of Recent Metallurgical Advances in American Automobile Manufacturing. J. L. McCloud. *Metal Progress,* v. 74, Oct. 1958, p. 130-133.

Among the recent changes and those soon to come in materials for automotive use, the trends toward low-alloy and carbon steels and toward greater use of Al seem the most significant. (T21, 17-57)

454-T. Magnesium: Will It Find Biggest Market in Missiles? Carl N. Mortenson. *Missiles and Rockets,* v. 4, Sept. 8, 1958, p. 46-49.

Examples of the expanding application of ten Mg alloys. (T24e, 17-57; Mg)

455-T. Broad Aspects of Absorber Materials Selection for Reactor Control. W. K. Anderson. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 357-372.

Selection of materials for control of nuclear reactors employing a variety of coolants and working over a broad range of neutron spectra considered from a qualitative standpoint. The materials discussed include hafnium, boron, cadmium, indium, silver, europium, gadolinium and samarium. 11 ref. (T11j, 17-57; Hf, B, Cd, In, Ag, Eu, Gd, Sm)

456-T. Nuclear Requirements for Control Materials. H. E. Stevens. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 373-385.

Nuclear factors affecting the effectiveness of control rod materials for power reactors with a thermal or near-thermal neutron spectrum. Principal elements and isotopes which qualify as neutron absorbers are compared and physical requirements such as rod thickness, surface density and weight ratios noted. 4 ref. (T11j, 17-57, P18)

457-T. Use of Boron Carbide for Reactor Control. W. K. Barney, G. A. Sehmel and W. E. Seymour. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 439-448.

Use of B_4C for the control of a sodium-cooled reactor considered from a design standpoint. Nuclear, mechanical and physical properties and irradiation data. 10 ref. (T11j, 17-57, 2-67; B, 14-68)

458-T. Development of a Composite Control Rod. G. W. Cunningham, A. K. Foulds, D. L. Keller and W. E. Ray. *Nuclear Science and Engineering,* v. 4, Sept. 1958, p. 449-457.

Scarcity and high cost of Hf for use as a reactor control material has led to the development of a composite control rod of Hf and B^{10}. Fabrication techniques. (T11j, 17-57; Hf, B)

459-T. Molybdenum as a Bearing Material. R. H. Warring. *Power Transmission,* v. 27, Sept. 1958, p. 548-550, 554.

(T7d, 17-57; Mo)

460-T. Your Guide to Springs That Store Energy Best. Karl W. Maier. *Product Engineering,* v. 29, Nov. 10, 1958, p. 71-76.

Energy depends on shape and material. Equations and tables that give definite comparisons between many candidates, materials. (T7c, Q-general, 3-73, 2-60)

461-T.* Role of Metallurgy in Atomic Energy Technology. Pt. 2. Fuels for Nuclear Reactors. A. Blainey. *South African Institute of Mining and Metallurgy, Journal,* v. 58, July 1958, p. 609-634.

Possibility of using natural U as a nuclear fuel has great significance for South Africa which has no separation plant for production of U^{235}. (T11g, 17-57; U)

462-T. Research and Development on Ultra-Thermic 500° C. Capacitors. A. L. Berg. Servomechanisms, Inc. (Wright Air Development Center), *U. S. Office of Technical Services,* PB 131848, Apr. 1958, 90 p. $2.25.

Ultra-thermic capacitors for operation to 500° C. were fabricated using successive layers of Pt and dielectric materials deposited by vacuum thermal evaporation. (T1e, L25, 2-61; Pt)

463-T. Feasibility Studies on Molten Metal Reactor Components. Ray W. Fisher and Charles B. Fullhart. Second United Nations International Conference on the Peaceful Uses of

Atomic Energy. A/CONF.15/P/1032, 1958, 17 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Molten Mg-Th alloy of composition in the range of the Mg-rich eutectic was circulated in Ta at temperatures up to 800° C. Data indicated that Ta is a satisfactory material for containing molten Mg-Th alloys under temperature conditions that may be imposed on a molten blanket material in a nuclear reactor. 9 ref.
(T11g, 17-57; Mg, Th, Ta)

464-T. Use of Aluminum as Fuel Cladding in High-Temperature Water Cooled Reactors. J. A. Ayres, R. L. Dillon and R. J. Lobsinger. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1430, 1958, 9 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Corrosion rates of Al in high-temperature high-pressure water systems measured both inside and outside of a reactor. Equipment consisted of autoclaves, flow tubes and in-reactor flow loops.
(T11g, R11; Al, 8-66)

465-T. Liquid Metal Fuel Reactor With Recycled Plutonium. F. T. Miles, T. V. Sheehan, D. H. Gurinsky and H. J. C. Kouts. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/461, 19 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Fuel is a solution of the steady state mixture of Pu isotopes in Bi. The solution also contains U^{238}, Mg and Zr as corrosion inhibitors, and fission products. Fuel reprocessing includes degassing and extraction with molten salts, which is designed to keep neutron capture by fission products below 3%. 11 ref.
(T11g, P18; Pu, U, Mg, Zr)

466-T. Recycle of Plutonium in Low-Enrichment Light Water Reactors. P. Greebler, W. H. Harker, J. M. Harriman and E. L. Zebroski. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/2167, 1958, 39 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Detailed model of the physics of a reactor operating with recycle Pu fuel. Model takes into account spectral and geometric effects which must be considered for lattices in which the resonance region is important. Modes of operation available with Pu recycle. 19 ref.
(T11g, P18; Pu)

467-T. Material and Fuel Technology for an LMFR. C. J. Klamut, D. G. Schweitzer, J. G. Y. Chow, R. A. Meyer, O. F. Kammerer, J. R. Weeks and D. H. Gurinsky. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/2406, 1958, 58 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Materials which can be used in contact with U-Bi fuels in liquid metal fuel reactor systems (LMFR) are graphite, Be, carbon steels, low-Cr steels Mo, Ta, W and some high-alloy steels. Corrosion products resulting from immersion of these materials in U-Bi should not reduce the solubility of U in Bi. 36 ref.
(T11g, R6m; U, Bi, Be, CN, Mo, Ta, W, Cr)

468-T. (French.) **Copper Sheathing in Finnish Architecture.** Erkki Valve. *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 11-15.
(T26n, 17-57; Cu-b)

469-T. (French.) **The New Roof of the Copper Information Center in Paris.** *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 17-19.
(T26n, 17-57; Cu-b)

470-T. (French.) **Copper Cooking Utensils.** *Cuivre, Laitons, Alliages,* no. 44, July-Aug. 1958, p. 21-24.

Strong case for Cu as ideal metal for food preparation. Care and cleaning hints. (T10a, 17-57; Cu-b)

471-T. (German.) **Hexagonal Hard Metal End-Milling Cutter.** Hans-Jorn Burmester. *Industribelatt,* v. 58, Sept. 1958, p. 379-383.

Novel end-milling cutter provided with exchangeable hard metal blades that are discarded after using. Applications: milling of steel, steel castings, gray cast iron. 4 ref.
(T6n, G17b; 6-69)

472-T. (German.) **Platinum Metals Utilized as Catalysts.** J. Sagoschen. *Metall,* v. 12, July 1958, p. 604-611.

Survey of historic development, theory, production methods and applications. 139 ref. (T29d, 17-57; Pt)

473-T. (German.) **Hard Metal Tools for Precision Work.** Hans-Jorn Burmester. *Schriftenreihe Feinbearbeitung*, no. 29, 1958, p. 9-55.

Hard metal precision tools classified as one-edge machining tools, multiple-edge machining tools and tools for plastic deformation. 20 ref. (T6n; 6-69)

SECTION W

PLANT EQUIPMENT

1-W. (German.) **Synthetic Resin Cores.** F. Paschke. *Giesserei Praxis,* v. 75, Sept. 10, 1957, p. 369-373.

Resins available; equipment necessary; operation; advantages; economics. (W19g; NM-f45)

2-W. (German.) **Fabrication of Two Patterns for Rolling Mill Housings.** Friedrich Lamm. *Giesserei,* v. 44, Aug. 29, 1957, p. 520-522.

Report No. 2 of the Technical Committee on "Pattern Making" of the Verein Deutscher Giessereifachleute; pattern design; cost analysis. (W23m, 17-51; ST)

3-W. (German.) **Steel Structure in Power Industry.** Fritz Reinitzhuber. *Schweisstechnik,* v. 11, July 1957, p. 73-80.

Pressure conduits and shafts; harbor constructions; hydro-power stations; steel poles; development of arc welding technique. (W11, 17-57, K1; ST)

4-W. (Russian.) **Improved Location of Blast Furnace Mixing Valves.** N. N. Chernov, I. F. Domnitskii and I. A. Suchkov. *Stal',* v. 17, May 1957, p. 389-391.

By placing the mixing valves between the blast furnace and the first stove the performance of the hot blast brick lining was considerably improved and the mixture of cold and hot air became satisfactory. (W17g, 1-52; RM-h, Fe)

5-W. (Russian.) **Comparison of Tilting and Stationary Openhearth Furnaces.** V. V. Leporskii, E. A. Kapustin, G. M. Glinkov and P. N. Slepkanev. *Stal',* v. 17, May 1957, p. 411-413.

In view of the ever-broadening use of high-phosphorus ores and ores with alloying constituents, the authors compare the characteristics of the two types of furnaces. 5 ref. (W18r, 1-52; ST, RM-n)

6-W. (Russian.) **Determination of Minimum Power Consumption in the Electric Arc Furnace.** N. A. Markov. *Stal',* v. 17, May 1957, p. 419-424.

Mathematical analysis of power consumption and other performance data. 8 ref. (W18s, 16-61)

7-W. (Russian.) **Improved Pass Design for Cold Rolling Pipe.** Yu. F. Shevakin, Ya. E. Osada, O. A. Semenov and F. S. Seidaliev. *Stal',* v. 17, May 1957, p. 441-444.

The Moscow Steel Institute has developed a method for designing rolls for cold rolling pipe (or tubes) which combines the most favorable gorge angle with advantages resulting from rolling pipe on low-taper mandrels. 5 ref. (W23k, 17-51; 4-60)

8-W. (Russian.) **Production of Rolls With Cast Profiles.** A. E. Krivosheev and B. B. Ezerskii. *Stal',* v. 17, July 1957, p. 663-665.

Method is claimed to be the only successful one in the world for manufacture of durable cast rolls. 3 ref. (W23k, E general; CI)

9-W. **New Mill Ups Tube Production.** *Steel,* v. 141, Nov. 18, 1957, p. 214-215.

Automatic tubemaking featuring outsize drawbench. (W18h, 1-52; Cu)

10-W. (Czech.) **Quality Improvement of Lubricating Asphalt for Roll Necks in Rolling Mills Designed for Thin Sheet.** Bohuslav Otta and Josef Teindl. *Hutnicke Listy,* v. 12, Sept. 1957, p. 803-808.

(W23c, 1-52; NM-h)

11-W. (German.) **Aluminum as Reactor Material.** J. Staehelin. *Metall,* v. 9, Sept. 1957, p. 746-752.

Aluminum, like magnesium, compared to other reactor materials, behaves remarkably well. A life table of Al and alloys, as compared with other reactor materials. Metal, water, organic liquid and gas cooling. Thermal conductivity, corrosion, shielding of fission products and radiation damage. (W11p, 17-57; Al)

12-W. (German.) **Materials for Heat Conductors in High-Temperature Furnaces.** R. Kieffer and F. Benesovsky. *Planseeberichte für Pulvermetallurgie,* v. 5, Aug. 1957, p. 56-71.

Physical properties of metallic heat conductors (Mo, W, Ta, $MoSi_2$); their behavior in different atmospheres and toward various ceramic materials; applications in different types of furnaces. 22 ref. (W27p, P11h, 17-57; Mo, W, Ta)

13-W. (German.) **Life of Pig Iron Mixer Lining.** Alfred Latour. *Stahl und Eisen,* v. 77, Aug. 22, 1957, p. 1122-1126.

Life of single mixer extended by grinding the surfaces of the bricks and dry walls; provision of an expansion joint; ample heating-up time; stiffening of the filling and discharge opening and lining of the mixer; control of most troublesome spots by temperature measurements. (W18n, 1-52; RM-h)

14-W. (German.) **New Methods of Cooling by Water.** Rudolf Vonnemann. *Stahl und Eisen,* v. 77, Aug. 22, 1957, p. 1126-1135.

Reduced water consumption by natural circulation; steam discharge in the cooling system; pressure; application to heating and melting furnaces, blast furnaces, converter stacks, horizontal cooling elements. (W10f, 1-52)

15-W. (Polish.) **Application of Cold Rolled Transformer Steel Sheet in Design of Electric Machines.** A. Sliwowa. *Hutnik,* v. 24, July-Aug. 1957, p. 304-311.

Standards, properties and application; design problems. 10 ref. (W11q, W11r, 17-57; SGA-r, AY)

16-W. (Russian.) **Selection of Checkers for Intensive Heating Recuperators.** I. D. Kirichenko. *Metallurg,* v. 2, July 1957, p. 7-10.

Design and characteristics of two types. (W17g)

17-W. Ceramic Crucible for Melting Titanium. B. C. Weber, et al. *American Ceramic Society, Journal,* v. 40, Nov. 1957, p. 363-373. (CMA)

Modified oxygen-deficient zirconia. 16 ref. (W18c, E10p; Ti, Nm-40)

18-W. A Swedish Non-Ferrous Foundry. *Foundry Trade Journal,* v. 103, Nov. 21, 1957, p. 609-612.

Equipment and methods in use at Broderna Soderberg, Sweden. (W18, W19, E general)

19-W. Rolling Mill Spindle Maintenance at Gary Steel Works. I. D. Pottorf and Russell H. Davis. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 79-84.

(W23n; 18-71)

20-W. Standards and Classification of Lubricant for Steel Mills. J. D. Lykins. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 101-104.

(W10; NM-h)

21-W. Silicone Lubricants for the Steel Industry. W. H. Ragborg and W. H. Badger. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 105-108.

Properties of silicone fluids, silicone greases and application of silicone in the steel industry. (W10; NM-h)

22-W. Revaluation of the 84-In. Plate Mill Modernized at Alan Wood. Frank J. Bampton. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 113-116.

(W23b; ST)

23-W.* Bottoms for Basic Open Hearth Furnaces. Stephen Wortman. *Iron and Steel Engineer,* v. 34, Nov. 1957, p. 127-133.

Construction and maintenance; types of hearth construction; materials commonly used. (W18r, 1-65; RM-h)

24-W. Electric Drive Systems for Bar and Rod Mill Shears. A. J. White and J. A. Read. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 166-173.

General information on operation of shear; need for balance between design of shear and its electrical drive problems. (W23d, F29q, 1-53)

25-W. Proposal for a Self-Lining Blast-Furnace. W. A. Archibald, T. P. Brown and L. A. Leonard. *Iron and Steel Institute, Journal,* v. 187, Sept. 1957, p. 32-45.

Studies of flow of granules through blast furnace by means of models, proposed system of blast furnace construction to counteract wear, scaffolds and hanging. Characteristics of this design are water-cooled shafts to take advantage of

refractiveness of burden and stack tuyeres. 5 ref. (W17g; ST)

26-W.* Low-Shaft Blast Furnace Adds New Promise. F. Weston Starratt. *Journal of Metals,* v. 9, Nov. 1957, p. 1432-1434.

Basic idea of the Demag-Humbolt furnace is the simultaneous carbonization and reduction of briquettes made of a mixture of proper composition—ore fines and finely ground ores, fluxes and noncoking bituminous coal with 30 to 35% volatile matter to meet the demands of the desired type of pig. (W17h, 1-52; CI-a)

27-W.* Rotor Steelmaking Process. Rudolf Graef, Walther Dick and Ludwig Von Bogdandy. *Journal of Metals,* v. 9, Nov. 1957, p. 1435-1439.

Rotary furnace at Oberhausen, Germany, is sufficiently large to receive the whole tap of the adjoining blast furnace, amounting to 60 tons. Estimated capital and operating costs; future prospects. 3 ref. (W18b, 1-52; ST)

28-W.* Case Studies in Cast and Rammed Arc-Furnace Roofs. J. D. McCullough. *Journal of Metals,* v. 9, Dec. 1957, p. 1521-1524.

Monolithic constructions in center sections of arc-furnace roofs have proven a practical method of reducing refractory roof costs, offering maximum economy when either rammed or cast. Avoiding laminations and insuring volume stability are important considerations. (W18s; RM-h, ST)

29-W. Analysis of Arc Furnace Control. J. H. Kogen. *Journal of Metals,* v. 9, Dec. 1957, p. 1525-1528.

Arc current and arc voltage are measured by means of current and potential transformers. An actuator is mechanically coupled to the electrode mast and positions the electrode until the desired balance between current and voltage is obtained. (W18s, T1m, 1-52)

30-W.* Metallurgy of EBWR. Karl F. Smith. *Metal Progress,* v. 72, Nov. 1957, p. 79-83.

Development of first experimental boiling water reactor created several metallurgical problems not previously encountered in atomic energy utilization. In finding solutions, Argonne National Laboratory developed new alloys and new fabricating techniques. (W11p, T11, 17-57; U, Zr, ST, SS)

31-W. New Arc Furnace Has 66-KV. Transformer With On-Load Tap Changing. *Metallurgia,* v. 56, Nov. 1957, p. 242-243.

At the Stocksbridge works of Samuel Fox & Co., Ltd. (W18s, D5; ST)

32-W. Plastic Press Dies Reduce Aircraft Production Cost. Joseph J. Mele. *Modern Industrial Press,* v. 19, Nov. 1957, p. 20-21.

Procedure used in making epoxy forming die. (W24n; NM-d)

33-W. Efficient Casting Is Done Best With Proper Temperature Control Equipment. Nicholas A. Jannetto. *Precision Metal Molding,* v. 15, Dec. 1957, p. 76-79. (W19f, X9; Al)

34-W. New Mill Will Roll Tough Steels. *Steel,* v. 141, Dec. 2, 1957, p. 99-100.

Cogging mill with diamond grooved rolls proves to be best way to roll high-speed steels and superalloys. (W23a, F23n; TS, SS)

35-W. Vacuum Crane Speeds Mill Output. *Steel,* v. 141, Dec. 2, 1957, p. 102-105.

Automatic lift avoids scratches and controls cycling time on stainless steel sheets at Atlas plant. (W12q, F23, 4-53; SS)

36-W. Grinding Wheels Need Care for Best Service and Life. *Welding Engineer,* v. 42, Dec. 1957, p. 74-78.

Inspection, storage, mounting, speed control. (W25s)

37-W. Electric Roller Hearth Furnaces. *Wild Barfield Heat-Treatment Journal,* v. 6, Sept. 1957, p. 10-14.

Equipment, advantages of roller hearth and versatility in heat treating variety of ferrous and nonferrous parts. Common applications include annealing tubes, sections and strips or bars. (W27j)

38-W. Tests Carried Out on Diamond Wire-Drawing Dies. Pt. 2. *Wire Industry,* v. 24, Oct. 1957, p. 945-953.

Assessment of diamond wire drawing dies and their performance in drawing Cu wire. (W24n; Cu, 4-11)

39-W. (French.) Contribution to the Study of Rolling Mill Equipment. Pt. 2. (Continued.) Equipment for Rolling Semifinished Products. G. Grenier. *Echo des Mines et de la Metallurgie,* no. 3508, Sept. 1957, p. 521-523.

Types of equipment used 1920-1935 in U. S. and Europe; present types; comparison of continuous rolling mill and in-line mill, with reference

to operating conditions, equipment, procedure. (To be continued.) (W23)

40-W. (French.) **Several Types of Cowper Heat Accumulators.** D. Sanna and M. Pasquet. *Institut de Recherche de la Sidérurgie,* Ser. A, no. 130, Oct. 1957, p. 1-67.

The heat accumulation is worthwhile as long as the wind temperature required by the furnace is maintained at a moderate value. The cowpers are too powerful for the requirements of blast furnaces. 29 ref. (W17m)

41-W. (German.) **Shallow Millers for Surface Milling.** A. Ringel. *Fertigungstechnik,* v. 7, Aug. 1957, p. 374-378.

Operation, advantages, economy, applications. 2 ref. (W25r)

42-W. (German.) **Design Changes in a Pusher-Type Furnace of a Three-High Mill.** Günther Barth. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1459-1464.

Blast furnace gas firing, automation, instrumentation, measuring by Venturi tubes, construction of preheating furnace. 3 ref. (W20h)

43-W. (German.) **New Wire Rod Mill of the Klockner—Huttenwerk Haspe at Hagen-Haspe.** Arthur Weyel and Hans Weide. *Stahl und Eisen,* v. 77, Oct. 1957, p. 1464-1476.

(W23d, F23)

44-W.* **Walking Beam Furnaces.** K. Roney. *Electrical Review,* v. 161, Sept. 6, 1957, p. 403-407.

Electric furnaces for all types of heat treatment of heavy or bulky parts have system of moving hearth beams. (W27)

45-W. Hydraulic Equipment in Steelworks. Pt. 4. Modern Pumps and Motors. F. B. Levetus. *Iron and Coal Trades Review,* v. 175, Aug. 30, 1957, p. 494-496.

(W13d, W11q)

46-W. (German.) **High-Frequency-Heating for Surface Hardening, Local Annealing and Brazing.** F. L. Gladivin. *Elektrowärme,* v. 15, Aug. 1957.

(W27k, W29n)

47-W. (German.) **Cast Iron in the Construction of Machine Tools.** Ernst Schültz. *Industrie Anzeiger,* v. 79, Aug. 16, 1957, p. 987-990.

(W25, 17-57; CI)

48-W. (German.) **All-Basic Open-hearth Furnace.** R. P. Heuer and M. A. Fay. *Radex Rundschau,* no. 4, July 1957, p. 601-654.

Historical review; present practice; future possibilities. 137 ref. (W18r, D2; ST)

49-W. (German.) **Steam Turbines for High Temperature and Pressure. General Material and Construction Problems. Pt. 2.** Carl Brennecke and Rudolph Schinn. *VDI Zeitschrift,* v. 99, Sept. 1, 1957, p. 1233-1244.

23 ref. (W11k, 17-57; ST, SS)

50-W. Making a Forging-Ingot Mould With Skeleton Pattern. F. H. Gartland. *British Foundryman,* v. 50, Nov. 1957, p. 560-562.

(W19c, 17-57; CI)

51-W. (Czech.) **Basic Lining of Electric-Arc Furnaces Producing Low-Carbon Steels.** Jaroslav Dobry. *Hutnicke Listy,* v. 12, Oct. 1957, p. 907-913.

12 ref. (W17j; CN-g)

52-W. (German.) **Cupola Furnace Charging Column Level Measurement by Gamma Radiology.** Alfred Rexroth. *Giesserei,* v. 44, Nov. 7, 1957, p. 695-696.

(W18d, S18q)

53-W. (German.) **Load and Mode of Operation of the Electric Drive in Blooming Mills. Pt. 3.** Werner Nurnberg. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1593-1607.

5 ref. (W23a, W23n; 4-52; ST)

54-W. (German.) **Control and Regulation of the Twin Drive of a Plate Rolling Mill.** Otto Martin. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1607-1610.

6 ref. (W23b, W23n, 4-53; ST)

55-W. (Russian.) **Sintering Plant Dust Removal Apparatus.** A. V. Sheleketin and N. S. Karpushinskii. *Metallurg,* v. 2, Aug. 1957, p. 10-12.

(W13c, B15)

56-W. (Russian.) **Perfection of Open-hearth Furnace Head.** A. P. Klyucherov and L. V. Makogonov. *Metallurg,* v. 2, Aug. 1957, p. 26-27.

(W18r, 17-51)

57-W. Heating Unit Debonds and Blues Rotors for Electric Motors. *Industrial Heating,* v. 11, Nov. 1957, p. 2298.

Gas-fired rotary heating unit speeds production to 400 units per hr. (W28r, L14; ST)

58-W. Detroit Steel's New Furnace Installation for Bright Annealing of Cold Rolled Strip. *Industrial Heating,* v. 11, Nov. 1957, p. 2313-2316.

(W27, J23a; ST, 4-53)

59-W. Welding Vs. Melting. R. G. LeTourneau. *Machine and Tool Blue Book,* v. 52, Dec. 1957, p. 134-138.

Tourna melting machine, similar to a squirt welder, greatly increases production. (W29, 1-52; ST)

60-W. Vapour Blasting Equipment for Integrally-Stiffened Wing Panels. R. Furgeson and J. R. Eggum. *Machinery,* v. 91, Oct. 18, 1957, p. 918-919.

Equipment for automatic deburring and blending of wing panels by means of vapor blasting. (W2r, L10c, T21a; Al)

61-W. Heat Checking in Die Casting Dies. H. K. Barton. *Machinery,* v. 91, Oct. 25, 1957, p. 982-990.

Mechanism of heat checking and its influence on serviceability of die casting dies. Design precautions. (W19n, 9-22; ST)

62-W. Plating Hoover Steam-or-Dry Irons. *Product Finishing (London),* v. 10, Nov. 1957, p. 83-86.

Floor plan and operating details of automatic plating machine installed at High Wycombe factory. (W10a, L17, 1-52; *Cu, Ni, Cr)*

63-W. Silicon Rectifiers Improve Features of D-C. Welders. E. F. Steinert. *Welding Engineer,* v. 43, Jan. 1958, p. 38.

(W29a, 1-52)

64-W.* Safeguards Aspects of Reactor Vessel Design. D. R. Miller and W. E. Copper. *Welding Journal,* v. 37, Jan. 1958, p. 22s-26s.

Internal heat generation in structural materials, radiation-induced changes in mechanical properties, thermal shock and strain cycling, and coolant-dissociation effects on corrosion and embrittlement, all present problems which require close attention. 12 ref. (W11p, 17-57)

65-W. Rotary Retort Furnace Duplex Quench Improves Case Hardening of Fasteners. William Schmidt. *Western Metals,* v. 15, Oct. 1957, p. 43-45.

(W27g, J28, T7f; CN, AY, SS)

66-W. Effect of Process Variables Upon the Design of Centrifugal Pipe-Casting Machines. A. A. Mikhel'son. *Stal',* v. 16, no. 4, 1956, p. 348-351. (Henry Brutcher Translation no. 4016, Altadena, Calif.)

Design governed by action of liquid metal on principal parts of centrifugal pipe-casting machine. (W19, E14; 17-51, 4-60)

67-W. Pipe Maker Installs Water-Cooled Cupola. J. H. Rehder. *Canadian Metalworking,* v. 20, Nov. 1957, p. 30-36, 69.

(W18d, E10a, 1-55; CI)

68-W. Semi-Continuous Casting Made Easy. *Canadian Metalworking,* v. 20, Nov. 1957, p. 50-52.

Simple machine, replacing hydraulic system of casting, may bring continuous casting of nonferrous slabs and billets into wider use. (W19f, C5q, 4-52; Al, Mg)

69-W. Convector Oven or Infra-Red Radiation? M. Reeves. *Industrial Finishing (London),* v. 9, Oct. 1957, p. 852-857.

Conveyor-type ovens for baking and drying metal finishes; compares relative merits of convection and infra-red radiation. (W4k)

70-W. Mechanical Presses. Their Selection, Design, and Function. Pt. 1. *Modern Industrial Press,* v. 19, Oct. 1957, p. 43-50.

Procedure for determining correct size, capacity and operating speeds of a press. Difference between single and double presses and type of stamping each is suited to. (To be continued.) (W24g)

71-W. (Russian.) The Leningrad Stalin Metal Plant. A. I. Chizhik. *Metallovedenie i Obrabotka Metallov,* no. 11, Nov. 1957, p. 66-71.

Parts for steam turbines are made. 27 ref. (W10; W11k; ST)

72-W. (Russian.) Investigation of Performance of Blast Furnace Shaft Carbon Lining. F. A. Khilkevich and S. V. Bazilevich. *Stal',* v. 17, Sept. 1957, p. 769-771.

Carbon lining lasts longer than fireclay lining and heat losses remain the same. (W17g; RM-h39)

73-W.* (Russian.) Application of Electric Integrator in Investigation of Temperature Distribution in Blast Furnace Hearth Bottom and Foundation. V. V. Yushkin. *Stal',* v. 17, Sept. 1957, p. 779-787.

Most efficient drop of temperature of interior surface of the foundation was obtained for fireclay lining spread over carbon lining with resulting low penetration rate of the liquid pig iron. 4 ref. (W17g, D1; RM-h)

74-W. (Russian.) Application of Unburnt Magnesite-Chromite Bricks in Openhearth Furnace Roofs. M. Broit. *Stal',* v. 17, Sept. 1957, p. 792-795.

Openhearth furnace roofs made of unburnt magnesite-chromite bricks last at least twice as long as silica brick roofs. 3 ref. (W18r; RM-h)

75-W. Heat Checking of Ingot Molds. N. I. Pavlovtseva and L. M. Cherkasov. *Stal'*, v. 17, Sept. 1957, p. 800-804. (Henry Butcher, Altadena, Calif., Translation no. 4062.)

Considerable decrease of number of cracks in cast iron ingot molds can be obtained by modification of the cast iron with Cr or Mg. 3 ref. (W19c, 17-57, 9-72; CI, *Cr, Mg*)

76-W. (Book.) Conference on Atomic Energy in Industry, v. 5, 202 p. 1957. National Industrial Conference Board, Inc., 460 Park Ave., New York 22, N. Y. $15.

Metallurgical articles abstracted separately. (W11p, T11, 17-57)

77-W. Induction Hardening Utilizing Frequencies of 2 to 10 Kc/s. Hermann Kuhlbars. *AEG Progress,* v. 3, 1957, p. 99-105.

Factors influencing selection of medium-frequency equipment; machines for static and progressive hardening, with operational details; components and lay-out of a crankshaft hardening plant. (W27k, J2g, T21c, 18-69)

78-W. Induction Heating for Hot Forming. Friedrich Scheffler. *AEG Progress,* v. 3, 1957, p. 109-114.

Thermal, mechanical and economic requirements of modern forging; appliances for induction heating. (W27k, F22)

79-W.* Induction Furnaces. Hans Harbauer. *AEG Progress,* v. 3, 1957, p. 114-123.

Principle of induction furnace; description, operation, application, electrical connection, advantages and disadvantages of channel and coreless furnace. (W27k)

80-W.* Electrical Equipment of Arc Furnaces in the Iron and Steel Industry. Albert Driller. *AEG Progress,* v. 3, 1957, p. 125-138.

Construction, electrical equipment and electrode control systems of 150-ton DEMAG arc furnace. New systems of high-speed automatic electrode control give more uniform energy consumption and greater economy. (W18s, X10, 1-53)

81-W. Electronic Control in Resistance Welding. Albert Gericke. *AEG Progress,* v. 3, 1957, p. 143-148. (W29c, K3)

82-W. Spark Plus Hardens Steel in Russia. I. I. Kichkin. *American Machinist,* v. 10, Dec. 2, 1957, p. 97-99. (From *Vestnik Mashinostroeniia,* v. 36, May 1956, p. 65-68.)

Previously abstracted from original. See item 190-J, 1956. (W28, L24, J28; ST, *Mg, Cr*)

83-W. Large Oven Furnace Program—Controlled for Versatile Heat Treating. Jere N. Helfat. *Industrial Heating,* v. 24, Dec. 1957, p. 2512-2516. (W27, J2g, 18-74)

84-W. Modern Controls for the Iron and Steel Industry. Pt. 1. *Industrial Heating,* v. 24, Dec. 1957, p. 2521-2526.

Abstracts on automatic valves, openhearth, telemetering and remote control, from papers presented at Seventh Conference on Instrumentation. (W18r, X10, X12)

85-W. New Methods in Maintenance of Refractories in Steel Plants. Pt. 2. *Industrial Heating,* v. 24, Dec. 1957, p. 2573-2576.

Improved methods of roof patching of openhearth furnaces. (To be continued.) (W18r, D2, 18-71; RM-h)

86-W. Dust Control. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 536-567.

Variety of processes and equipment in iron and steel industry create fumes and dust. Size and other properties of dust; operation, comparative efficiency and costs of common types of dust and fume control equipment including gravitational, inertial and centrifugal separators, washers, electrostatic precipitators and filtration units. Lists and describes British dust and smoke control plants. (W13c, A8a, 1-52; ST)

87-W. Electrical Equipment for a Modern Rod Mill. E. L. Anderson. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 112-126.

Electrical control equipment and drives at Bethlehem Steel Co., Johnstown, Pa. (W23n, W23d, 1-52; ST)

88-W. Asarco's New Electrolytic Plant at Corpus Christi, Tex. A. C. Jephson and R. E. Allen. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1381-1384.

Zinc plant for treatment of densified fume with capacity of 80 to 90 tons of high-grade Zn daily. Operation including storage and grinding of fume, leaching, purification, electrolyzing and casting. (W18e, 1-52, C19, C23; Zn)

89-W. Stretching the Wings of a DC-8. O. L. Rumble. *Machinery,* v. 64, Jan. 1958, p. 121-124.

A 600-ton press used to contour dihedral brake area of jet-liner wing skins. (W24g, G9, T24a; Al)

90-W. Production Speeded by Cold Extrusion. Karl Sieber. *Metalworking Production,* v. 101, no. 50, Dec. 13, 1957, p. 2215-2219.

German multi-stage press equipped with carbide dies used in cold extrusion of machine parts. (W24g, W24n, 1-52, G5)

91-W. What to Look for in Aging Oven Design. Carl Mayer. *Modern Metals,* v. 13, Jan. 1958, p. 56-57.

Importance of temperature uniformity throughout the oven; design factors making for optimum efficiency. (W27, 1-52, J27d; Al)

92-W. Versatile Automatic Large Oven Furnace. Jere N. Helfat. *Steel Processing and Conversion,* v. 43, Oct. 1957, p. 581-589.

Gas-fired oven furnace with inside dimensions of 6 ft. cubed camactuated program control used for stress-relieving, annealing or normalizing. (W27g, 1-52, J23, J24, J1)

93-W. Single Shift Produces 32 Different Products, 10,000 Aluminum Castings. James Joseph. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 84-86.

Production is maximized by use of overhead conveyor which insures inspection within 6 min. after casting, reducing high losses of scrap. (W12r, E general, 18-67, 18-74; Al)

94-W. (French.) **Steels for Molds Under Pressure.** M. K. I. Bengtsson. *Fonderie,* v. 140, Sept. 1957, p. 400-410.

Ingot molds undergo very severe stresses which depend on gradients of temperature and on Young's modulus and on Poisson's ratio of the steel. Influence of C, Si, Mn, Cr, Ni, Mo, W, V, Co and Ti. Thermal conductivity is decreased by the addition of any element except Co. Resistance to intergranular corrosion and mechanical properties of seven steels. Importance of heat treatment. Special surface treatments with nitrogen and sulphur give better resistance to temperature gradients. (W19c, 17-57, 2-60, Q general, R general; AY)

95-W.* (French.) **Heat Treating Small Parts: the Shock Furnace.** *Metallurgie et la Construction Mécanique,* v. 89, Nov. 1957, p. 959-963.

Principle and operation of shock furnaces. (W27j)

96-W. (German.) **Induction Melting Furnaces.** Walter Annen. *Berg-und-Hüttenmännische Monatshefte,* v. 102, July-Aug. 1957, p. 189-197.

Principles and properties of induction heating with special regard to crucible furnaces using low and medium frequences. (W18a, W18c, 1-52)

97-W. (German.) **Production of Iron and Steel.** Georg Bulle. *VDI Zeitschrift,* v. 99, Oct. 21, 1957, p. 1541-1546.

Practical advice on the construction of new mills. 51 ref. (W17, W18, W23, 1-52; ST)

98-W. (German.) **Residual Stresses in Hot Rolling Rolls After Heavy Service.** Hans Bühler. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1740-1747. 14 ref. (W23k, F23, Q25)

99-W. (Italian.) **Standards for Rational Dimensioning of Compressed Air Equipment in Foundries.** Pier Giacomo Lanino. *Fonderia,* v. 6, Nov. 1957, p. 481-484.

(W19m, 18-67)

100-W. (Japanese.) **Iron Crucible Linings for Aluminum Melting.** Hiroshi Oikawa, Keizo Nishida and Shigeyasu Koda. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 40-47.

In a study of lining materials, alumina mixed with 2% sodium bicarbonate was found best. 6 ref. (W18c, E10a; RM-h, Al)

101-W. (Russian.) **Power Plant Installations in the Iron and Steel Industry.** E. A. Dzhaparidze. *Stal',* v. 17, Nov. 1957, p. 1017-1023.

(W11, 1-52; ST)

102-W. (French.) **Copper Wire Rod Mill at the Le Havre Plant of Societe des Trefileries et Laminoirs du Havre.** *Cuivre, Laitons, Alliages,* no. 40, Nov-Dec. 1957, p. 13-18.

Renovated, largely automatic Garrett mill turns out 200 tons high-quality rod in 8-hr. shift with 43 workers. (W23d, 1-52; Cu)

103-W.* (French.) **A Half Million Motors Representing 1,500,000 Hp. Have Been Manufactured by Novacem.** Maurice Victor. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1201-1205.

Novacem Co. makes extensive use of Al and die-cast Alpax in Lyons plant for essential parts of asynchronous motors from ½ to 8 hp. (W11-5, 17-57; Al, 5-61)

104-W. (German.) **Machining of Aluminum Rolling Ingots With a New High Performance Milling Machine.** A. Roth. *Aluminium,* v. 33, Dec. 1957, p. 789-793.

Design and operation of the new machine for handling larger ingots. 10 ref. (W25r, W23g; Al, 5-59)

105-W. (German.) **Modern Wire Rolling Mills.** O. Wilmes. *Draht,* v. 8, Oct. 1957, p. 425-428.

Wire rolling mills with vertical rolls and independently operated stands; power input and distribution in a mill. (W24k, 1-2)

106-W. (German.) **Continuous Pusher-Type Heating Furnace With Full-Automatic Control in a Mill Rolling Special Steel Ingots.** Josef Heimerl. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1873-1877.

3 ref. (W20h, 1-61; ST, 5-59)

107-W. (Polish.) **Driving and Control of Reversed Rolling Mills for Cold Rolling of Strips.** W. Grzvbowski. *Hutnik,* v. 24, Sept. 1957, p. 363-369.

Design of driving and controlling device of the rolling mill insuring even thickness of the strip. 7 ref. (W23n, 17-51, W23f, 4-53)

108-W. (Russian.) **Equalizing Valves of Blast Furnaces.** D. A. Storozhik. *Stal',* v. 17, Oct. 1957, p. 874-883.

Design of an equalizing valve of the coupled type with a built-in electrodrive. (W17g, 17-51)

109-W. (Russian.) **Design Deficiencies of DSV-Type Arc Furnaces.** M. G. Dmitrienko and A. I. Sapko. *Stal',* v. 17, Oct. 1957, p. 902-904.

(W18s, 17-51)

110-W. (Russian.) **Wear of Rolls in Continuous Sheet Mills.** E. M. Palamarchuk. *Stal',* v. 17, Oct. 1957, p. 929-933.

Roll wear in continuous mills for hot rolling sheet. Both working and supporting rolls have to be inspected equally carefully to insure high-quality production. 4 ref. (W23k, Q9, 4-53)

111-W. Cupola With Continuous-Slit Tuyeres. A. A. Anan'in and B. P. Chernobrovkin. *Foundry Trade Journal,* v. 104, Jan. 30, 1958, p. 129. (Abridged translation from *Liteinoe Provizvodstvo.)*

Intensity of combustion occurring in a cupola is governed by the amount and quality of the fuel and on the quantity, temperature and composition of the blast. A new tuyere system has been developed in which the blast is introduced through peripheral slits. Construction employed and the results obtained. (W18d, E10a)

112-W. Baking Ovens for Paint Finishing Systems. Allen S. Dawe and John A. Kinn. *Industrial Heating,* v. 25, Jan. 1958, p. 127-139. (W4k, L26)

113-W. Powder Metal Press Gets Uniform Density in Odd Shapes. *Iron Age,* v. 180, Dec. 26, 1957, p. 56-57. (W26d, 1-52, J14)

114-W. Advanced Methods for Production of Direct-Current Motors and Generators. G. W. Ambro. *Machinery,* v. 91, Nov. 29, 1957, p. 1269-1275.

Equipment and methods in semi-automated machining, drilling, welding, milling, hardening and grinding. (W11q, G general)

115-W. Titanium-Tipped Anodizing Racks. *Metal Finishing,* v. 56, Feb. 1958, p. 65.

Tips determine life of the rack. Where once racks could only be used for a week to 10 days, the Ti tips have stretched the rack cycle to over three months. Some racks have lasted eight months without repairs. Comparative costs. (W3g, 17-57, L19; Ti)

116-W. New Mill Will Roll Tough Steels. *Steel,* v. 141, Dec. 2, 1957, p. 99-100.

A 32-in. cogging mill with grooved rolls used for rolling superalloys and high-speed steel ingots. (W23a; SS, SGA-h, TS-m)

117-W. Vacuum Crane Speeds Mill Output. *Steel,* v. 141, Dec. 2, 1957, p. 102, 105.

(W12q, 1-73; SS)

118-W. Loader Speeds Plating Line. *Steel,* v. 141, Dec. 2, 1957, p. 108.

Automatic handling of plating racks. (W12r, L17, 18-74)

119-W. How to Get More From a Spheroidizing Furnace. W. B. Leyda and Walter J. Assel. *Steel,* v. 141, Dec. 9, 1957, p. 208-210.

Controlled atmosphere, five-temperature-zone roller-hearth furnace anneals seamless alloy steel tubing. (W27n, J23r, 4-60; AY)

120-W. Spotwelder Speeds Assembly. *Steel,* v. 141, Dec. 16, 1957, p. 108.

Portable torch spot welder. (W29d, K3n)

121-W. Ductile Iron Moves In. *Steel,* v. 141, Dec. 16, 1957, p. 110-114.

Use of ductile iron in sintering plants, coke ovens, quenching cars, blast furnaces, openhearths and rolling mill. (W15, W16a, W18, W23, 17-57; CI-s)

122-W. Compacts Have Even Density. *Steel,* v. 141, Dec. 16, 1957, p. 116-119.

A 300-ton hydraulic compacting press achieves uniform density throughout powder metal part by proportional pressing. (W26d, H14g)

123-W. Continuous Annealing on a Grand Scale. C. E. Peck. *Steel,* v. 142, Jan. 20, 1958, p. 74-76.

Four-sectioned furnace anneals 60 tons of tin plate per hr.
(W27, J23n, 1-61; ST, *Sn,* 4-53)

124-W. Transfer Pressing. Gordon M. Sommer and Robert H. Barlow. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 386-391.

Transfer presses, their design, operations and benefits. (W24g)

125-W. (French.) **The Unit Die System.** Gustave Nyselius. *Fonderie,* no. 142, Nov. 1957, p. 516-517.

Advantages of system; preparation of unit dies, method of use.
(W19n, 1-52)

126-W. (Russian.) **Induction Crucible Furnaces of Industrial Frequency for Light Alloy Melting.** V. A. Yakovlev. *Liteinoe Proizvodstvo,* June 1957, p. 8-15.

Design of crucible suitable for melting Mg alloys. Details of melting process in high-frequency induction crucible. Computation of power required. Results of experimental melting. 6 ref. (W18a, E10p; Mg)

127-W. (Russian.) **Design of a Contemporary Forging and Stamping Factory.** A. D. Bogdan. *Vestnik Mashinostroeniya,* v. 37, Oct. 1957, p. 39-49.

(W10, F22, G3, 18-67)

128-W. Operations at Mount ISA Copper Smelter by the Smelter Staff. *Australasian Institute of Mining and Metallurgy, Proceedings,* no. 183, Sept. 1957, p. 17-42.

(W18r, C21, 1-52; Cu)

129-W. Performance Analyses of Screens, Hydrocyclones, Jigs and Tables Used in Recovering Heavy Accessory Minerals From an Intensely Decomposed Granite on the Jos Plateau Nigeria. F. A. Williams. *Institution of Mining and Metallurgy, Bulletin, Transactions,* v. 67, Pt. 3, 1957-58, p. 89-108.

(W15p, B14m, 1-52)

130-W. Time-Saving Methods in Modern Smelteries. C. C. Downie. *Mining Journal,* v. 249, Dec. 27, 1957, p. 772-773.

Study of chain-belt system used in refining of metals in U. S. A. 9 ref. (W12r, C21, 1-52)

131-W. Plastics in the Toolroom. *Steel,* v. 142, Feb. 3, 1958, p. 108-111.

Various properties offered by varying compositions of epoxy resins in dies and die caps.
(W22a, W24n, 17-57; NM-d)

132-W. (German.) **Simple Means of Transportation in the Foundry.** Werner Riege. *Giesserei,* v. 45, Jan. 1958, p. 23-25.

Equipment for conveying and supporting. (W12r, W19b, 1-52, 18-67)

133-W. (Russian.) **Cooler Plates in Shaft of Blast Furnaces.** S. M. Andoney, G. A. Kudinov and S. M. Liderman. *Metallurg,* Dec. 1957, p. 8-9.

(W17g, W10f, 1-52)

134-W. (Russian.) **Screening the Heat Resistant Tuyere Nozzles of Blast Furnaces.** L. Ya. Shparber. *Metallurg,* Dec. 1957, p. 13.

Guarding the tuyere nozzles at temperatures of 800° and more prevents their deformation, conserves heat and saves on coke. (W17g, D1b)

135-W. (Russian.) **Preparing the Teeming Ladle for Steel From Furnace.** G. M. Guzenfeld and L. G. Korolev. *Metallurg,* Dec. 1957, p. 24-25.

New method of preparing teeming ladle with oxygen and elimination of preliminary cooling.
(W19b, 1-52; ST)

136-W. (Russian.) **Speedy General Overhauling of Large Capacity Electric Furnaces.** M. G. Dmitrienko. *Metallurg,* Dec. 1957, p. 33-34.

Erection of temporary scaffold bridges which permits simultaneous working of all crews thus substantially reducing time for overhaul. (W17j, 18-72)

137-W. (Russian.) **Performance of Ural Sheet Mills.** N. I. Gubashev. *Metallurg,* no. 12, Dec. 1957, p. 33-34.

(W23c, 1-52; ST)

138-W. (Russian.) **Induction Furnaces of Industrial Frequencies.** V. S. Astaulov. *Liteinoe Proizvodstvo,* Dec. 1957, p. 5-8.

Compares induction furnace of crucible type with that of tubular furnace with iron core. Advantages of former in economy of fuel and quality of production.
(W18a, 1-52)

139-W. (Russian.) **Modernization of Duplicate Milling Machines.** M. B. Tumarkin. *Stanki i Instrument,* v. 28, Nov. 1957, p. 14-16.

(W25r, 1-52)

140-W. (Russian.) **New Radial Drill Machinery at the Odessa Plant.** B. M. Bromberg. *Stanki i Instrument,* v. 28, Nov. 1957, p. 37-39.
(W25p, 1-52)

141-W. Rolling Mills for Fuel Elements. A. I. Nussbaum. *Atomics and Nuclear Energy,* v. 9, Jan. 1958, p. 16-19.
Rolling and fabrication of the many new elements required for atomic age. Requirements of special equipment, avoidance of radioactive hazards and knowledge of special properties of materials.
(W23c, 1-52, T11; *Pu*)

142-W. 10 Advantages of Rapid Heating of Steel. Quentin M. Bloom. *Industrial Gas,* v. 36, Jan. 1958, p. 4-5.
(W27g, J-general; ST)

143-W. Blooming Mill Controls. M. P. Rathbone. *Iron and Coal Trades Review,* v. 176, Jan. 3, 1958, p. 19-25.
Developments in automation and punch-card techniques applied to operation of heavy rolling mills. Russian advances compared.
(W23a, S-18, 1-52, 18-74; ST)

144-W. Ultrasonic Drilling. *Mass Production,* v. 34, Jan. 1958, p. 73-75.
A new machine tool that will tap a thread ½ in. deep in tungsten carbide in 15 min. (W25p, 1-74)

145-W. New Double-Duo Bar Mill. *Metallurgia,* v. 57, Feb. 1958, p. 94-96.
(W23d; ST)

146-W. Progress at Ford's New Foundry. *Process Control and Automation,* v. 5, Jan. 1958, p. 14-18.
(W19, E-general, 18-67)

147-W. Reverberatory Aluminium Holding Furnace. *Refractories Journal,* v. 33, Dec. 1957, p. 547-549.
(W19a, 1-52; Al)

148-W. (Hungarian.) **Modern Molding Machines.** Lajos Kalman. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 81-87.
(W19h)

149-W. (Hungarian.) **Modern Roll Designing. Grooving of Rolls for Structural Shapes.** Jenö Mercader. *Kohaszati Lapok,* v. 12, Apr-May 1957, p. 150-156.
(W23k, 17-51)

150-W. (Hungarian.) **Shop Experiments on Graphite Crucible Life.** Karoly Maréchal. *Kohaszati Lapok,* v. 12, July 1957, p. 158-163.
(W18c; NM-K36)

151-W. (Hungarian.) **Production of Dynamo and Transformer Sheets.** Ernö Neuhöffer. *Kohaszati Lapok,* v. 12, July 1957, p. 289-291.
(W11q, W11r, 17-57; ST, SGA-n, 4-53)

152-W. Descaling Line Cuts Stock Costs. *Iron Age,* v. 181, Jan. 23, 1958, p. 86-87.
(W2r, L10c, 1-61; ST)

153-W.* **Magnetic Separators.** A. L. Wilson, Jr. *Iron and Steel,* v. 31, Feb. 1958, p. 71-72.
Magnetic separators used to decontaminate cold rolling mill coolant reduce cleaning time, eliminate much streaking on rolled steel, and possibly increase the life of oil seals and bearings. (W23p, 1-52; NM-h)

154-W. (German.) **New Openhearth Steel Plant No. 3 of the Hoesch-Westfalenhütte AG, Dortmund.** Hans von der Warth, Georg Henke, Ernst Wiegand and Wilhelm Nellen. *Stahl und Eisen,* v. 78, Jan. 23, 1958, p. 79-87.
(W18r, D2, A5b, 10-55)

155-W. (German.) **Full-Continuous Medium Strip Rolling Mill at the Th. Wuppermann GmbH Plant, Lever-Kusen.** Heinrich Lampmann. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 160-167.
(W23c, F23, 1-61)

156-W. (Hungarian.) **Significance of Basic Lined Hot Blast Cupola for Openhearth Establishments.** Ferenc Varga. *Kohaszati Lapok,* v. 12, Jan-Feb. 1957, p. 24-30.
7 ref. (W18c, W18r, 1-52; RM-h)

157-W. Automatic Gauge Control in Cold Strip Rolling Mill. *Instrument Practice Automation and Electronics,* v. 12, Jan. 1958, p. 57-61.
(W23c, X20c; Cu-n)

158-W. Push-Button Steel. *I. S. A. Journal,* v. 5, Feb. 1958, p. 66-67.
A card programmed control system makes rolling equipment completely automatic. Thickness is measured by X-ray.
(W23c, S18, X20c, ST)

159-W. New Bar Mill. *Iron and Steel,* v. 31, Feb. 1958, p. 53-55.
The mill, a five-stand double duo type fitted with roller bearings, will replace two existing mills and be used for rolling high speed tool and alloy steel bars to close dimensional tolerances. (W23d, 1-52; TS, AY)

160-W. (German.) **Induction Furnace for Melting of Heavy and Light Metals.** J. Tostmann. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 641-646.

Construction of line frequency induction furnaces. Melting of Cu and Zn cathodes in large furnaces. The submerged resistor-type improved by straight melting channels is preferred for melting of light metals. New refractory lining materials. (W18a, 1-52; Cu, Zn)

161-W. (German.) Line Frequency Induction Crucible Furnace for Melting of Nonferrous Alloys. H. Rohm. *Zeitschrift für Metallkunde,* v. 48, Dec. 1957, p. 650-654.
(W18a, 1-52; SGA-a38)

162-W. Development of Blast Furnace Tuyeres at Wheeling Steel. E. P. Quick. *Blast Furnace and Steel Plant,* v. 46, Mar. 1958, p. 307-309.
(W17g, 1-52)

163-W.* Why Metallurgy of Iron Shot Is Important. A. M. Hall. *Iron Age,* v. 181, Jan. 16, 1958, p. 84-86.

Properties sought in malleable iron shot, made from white iron, are abrasion resistance, toughness and high yield strength. These depend on the chemistry, macrostructure and microstructure of the material, all of which can be controlled. Desired characteristics are soundness, roundness, uniform distribution of graphite in compact formation, and limitation of massive iron carbide content.
(W2a, 17-57, Q-general, CI-s)

164-W. Metal Fibers Extend Life and Uses of Plastic Tooling. *Iron Age,* v. 181, Jan. 30, 1958, p. 100-101.
(W24n, 17-57, H17; NM-d)

165-W.* Recent Developments in Slabbing Mills. H. J. Kalberkamp. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 73-81.

Comparison of characteristics of the universal slabbing mill and the high-lift, two-high mill. The latter is simpler, more economical, easier to maintain and more flexible, but does not have the capacity of the former. (W23a, 1-52)

166-W.* Techniques in Rebuilding a Blast Furnace. C. F. Bessent. *Iron and Steel Engineer,* v. 35, Feb. 1958, p. 82-94.

Methods used in dismantling and rebuilding a furnace at Sparrows Point, Md., including removal of scrap and worn parts and installation of new linings and replacements. (W17g, 18-70; Fe)

167-W.* A New Quenchant for Steel. P. E. Cary, E. O. Magnus and W. E. Herring. *Metal Progress,* v. 73, Mar. 1958, p. 79-81.

A solution of polyvinyl alcohol in water gives cooling rates between those of water and oil; medium-carbon steel parts can be readily hardened with little danger of cracking. (W28p, NM-b)

168-W.* Salt Baths and Salt Bath Furnaces. Pt. 1. Haig Solakian. *Metal Treating,* v. 9, Jan-Feb. 1958, p. 4-6, 49.

Commonly used salt mixtures, heat treating applications and suitable furnace equipment for salt baths in the 300-1150° F. and the 1200-1800° F. ranges. (To be concluded.)
(W27m, W28p, 1-52)

169-W. Special Techniques in Vacuum Metallurgy. Pt. 2. Michael Rivera. *Metal Treating,* v. 9, Jan-Feb. 1958, p. 8-11.

Vacuum furnaces of the resistance, high-frequency induction and arc types. Furnace facilities for sintering and brazing; temperature control equipment.
(W18, W17, W27, 1-73, X9s)

170-W. Manufacturing Oil-Fired Air Heating Equipment. *Welding and Metal Fabrication,* v. 26, Jan. 1958, p. 2-8.

Cutting, forming and argon-arc welding, assembly procedures used to produce air heaters from stainless steel, heat resistant and mild steel. (W10e, G22, K1d; SS, ST)

171-W. A Vacuum Arc Study Chamber. E. W. Johnson and F. R. Itoh. Paper from "1956 National Symposium on Vacuum Technology", p. 170-174.

Apparatus developed to permit observation and photography of consumable electrode melting arcs for continuous periods up to 20 min.
(W18s, 1-74, X5j)

172-W. Problems Involved in Vacuum Arc Melting Furnaces and Development of These Furnaces at W. C. Heraeus GmbH. Germany. H. Gruber. Paper from "1956 Symposium on Vacuum Technology", p. 182-189.
(W18s, 1-73)

173-W. (German.) Reel and Coil Transportation Equipment in Wire Plants and Sheet Steel Rolling Mills. A. Hinders. *Draht,* v. 9, Jan. 1958, p. 1-8.
(W12r, W24k, W23c; ST)

174-W.* (German.) Planning of Hot Blast Cupola Furnaces for Gray Cast Iron Foundries. Ernst R. Becker.

Giesserei-Praxis, no. 2, Jan. 25, 1958, p. 21-28.

Main advantages of hot blast; most economical systems; conventional and liningless furnaces.
(W18d, 1-52; CI-n)

175-W.* (German.) **Cardinal Points of Planning of Hot Blast Cupola Furnaces.** Ernst R. Becker. *Giesserei-Praxis,* no 3, Feb. 10, 1958, p. 37-42.

Construction of recuperator with dust removal by means of "ball rain". Contrivance for temperature regulation and measuring of temperature, gas pressure and gas quantity. Appliance for dust removal in foundry; utilizing of exhaust gas; economic importance of hot blast cupola aggregates in steel foundries.
(W18d, W13c, X9, 1-53; ST)

176-W. (German.) **Modern Tempering Furnaces.** A. Hohmann. *Giesserei-Praxis,* no. 4, Feb. 25, 1958, p. 70-72.

Outline of tempering mechanism; importance of analysis of new ores; development and construction of modern furnaces (tunnel furnaces); advantages of electrical (resistance) heating. (W27j, J29, 1-52)

177-W. (German.) **Heat Resistant Materials for Gas Turbines.** R. Krause. *Metall,* v. 11, Dec. 1957, p. 1066-1069.
17 ref. (W11m, 17-57; SGA-h)

178-W. (Italian.) **Specific Minimum Cost of a Smelting Furnace for Aluminum.** Roberto Allara. *Fonderia,* v. 6, Dec. 1957, p. 513-516.

Equations covering cost of electric power, electrodes, salts and furnace lining in terms of quintals of alloy melted, based on experimental data recorded during series of melts.
(W17j, C21c, 17-53; Al)

179-W. (Portuguese.) **Mace Furnaces for Sintering Ores and Concentrates.** Tharcisio de Souza Santos. *ABM, Boletim da Associacao Brasileira de Metais,* v. 13, Oct. 1957, p. 329-347.
4 ref. (W15a)

180-W. Case for Radiant Heating in Paint Finishing Processes. F. Hunt. *Industrial Finishing (London),* v. 10, Jan. 1958, p. 33-37.

Limitations and advantages of electric radiant heating. (W4k, L26)

181-W. Modern Development of the Ward Leonard Principle and Application in Steelworks. G. Ovens and C. A. Dodd. *Iron and Steel Institute, Journal, v.* 188, Mar. 1958, p. 266-276.

Development of variable-voltage drive with shunt motor and its application according to Ward Leonard principle; comparison between motor-generator sets and mercury-arc rectifier; closed-loop regulating system, magnetic amplifier and tension control. (W23n, 1-52; ST)

182-W. Improving Electric Furnace Refractory Life by Special Shell Cooling Techniques. V. J. Howard. *Modern Castings,* v. 33, Feb. 1958, p. 68-70.
(W17j; RM-h)

183-W. New Type of Brazing Furnace. *Welding and Metal Fabrication,* v. 25, Dec. 1957, p. 469-471.

Furnace with 20-cu. ft. capacity employs special ceramic refractory which eliminates necessity of special metal container in the controlled-atmosphere brazing or heat treatment of mild or stainless steel at temperatures up to 1500° C.
(W29m, 1-52; CN, SS)

184-W. New Automatic Grinding Machine for Fabrication Shops. *Welding and Metal Fabrication,* v. 25, Dec. 1957, p. 472-473.

Machine removes excess weld metal from vessels from 3½ to 18 ft. in diameter. (W25s, G18)

185-W.* Corrosion and Materials of Construction in the Plating Room. T. J. V. Cudbird. *44th Annual Technical Proceedings, American Electroplaters' Society,* 1957, p. 91-94.

Simple chemical corrosion, galvanic corrosion and concentration cell corrosion are three main methods of corrosion in plating room; methods to minimize them. Applications of steel, Al, Pb, Si-Fe alloy, rubber, vinyls and plastics for tanks, tank linings, exhaust ducts, and other uses in the plating room.
(W3, 17-57, R6g)

186-W. (German.) **New Ceramic Oxide-Carbide Cutting Wheel.** C. Agte. *Fertigungstechnik,* v. 7, Oct. 1957, p. 466-448.

First experiments showed best results with a grinding wheel made of 60% Al_2O_3 and 40% Mo_2C. Properties of Al_2O_3 versus carbides tabulated; advantages; preparation and evaluation of the oxide-carbide combination. (W25c, 17-57; SGA-j, 6-70)

187-W. (German.) **Using Synthetic Resins in Patternmaking.** Heinrich Kmoch. *Giesserei,* v. 45, Jan. 30, 1958, p. 72-74.

Methods, costs, comparison with wood or metal patterns.
(W19j, E17, 17-57; NM-d)

188-W. (German.) **Construction and Operation of Modern Hot Blast Cupola Plants.** Siegfried Tunder and Adam Esser. *Giesserei,* v. 45, Feb. 13, 1958, p. 92-96.
3 ref. (W18d, E10a, 1-52)

189-W. (German.) **Method of Operation and Lining of the Graphite Electrode Melting Furnace.** Karl Wagner. *Giesserei,* v. 45, Feb. 13, 1958, p. 100-103.

9 ref. (W18s, E10r, 1-52, RM-h)

190-W. (German.) **Oil-Firing of Melting Furnaces for Copper Alloys, With Consideration Given to Sulphur Effect.** Paul Buttkereit. *Giesserei,* v. 45, Mar. 13, 1958, p. 139-141.

4 ref. (W18, R7d; Cu, *S,* RM-k30)

191-W. (German.) **Comparison of LF Induction Furnaces for Billet Heating With Gas or Resistance Heated Furnaces for Heating of Nonferrous or Iron Blooms for Hydraulic Extrusion Presses.** J. Putz. *Metall,* v. 12, Feb. 1958, p. 113-122.

4 ref. (W27, F21; 4-52)

192-W. (German.) **Hydro-Cyclone, an Important Element of the Water Supply System of an Integrated Steelworks.** Alfred Köhler. *Stahl und Eisen,* v. 78, Feb. 20, 1958, p. 235-239.

(W10h, ST)

193-W.* (Japanese.) **Melting Procedures for, and Properties of High-Purity Metals and Alloys. Pt. 1.** Hidetake Kusamichi. *Light Metals (Tokyo),* v. 8, Jan. 1958, p. 19-32.

An electric arc furnace with consumable electrodes made of the same material as the molten metal is suitable, not only for Ti and Zr, but for special steels as well as for heat resistant alloys. 10 ref.

(W18s, C5, D9, 1-52; Ti, Zr, SGA-h)

194-W. (French.) **Air-Coolers With Copper Heat Exchangers for Cooling Electric Power Transformers.** Edouard Laennec. *Cuivre Laitons Alliages,* no. 41, Jan-Feb. 1958, p. 35-39.

(W13b, W11f, 17-57; Cu)

195-W.* (German.) **Applications, Production and Heat Treatment of Alloyed Cast Steel Rolls. Pt. 2. Materials, Use and Casting of Steel Rolls and Various Methods of Heat Treatment.** Heinz Uhlitzsch and Gerhard Radomski. *Neue Hütte,* v. 3, Jan. 1958, p. 10-20.

Advantages of cast steel rolls; composition of suitable materials in relation to various purposes; appropriate methods of heat treatment; conditions and casting technique; causes of cracking and crack prevention. (W23k, 17-57, E11; ST)

196-W. (Polish.) **Automatic Loop Drive in Hot Rolling Mills.** Ryszara Hagel and Joachim Jonca. *Hutnik,* v. 24, Dec. 1957, p. 488-494.

7 ref. (W23n, 1-52)

197-W.* **International Views on Foundry Ventilation.** Antonio Riggi. *Foundry Trade Journal,* v. 104, Feb. 27, 1958, p. 237-243.

Smoke and dust-exhausting equipment installed in a cast iron and aluminum alloy foundry. 10 ref. (W13c, E-general; CI, Al)

198-W. Foundry Goggles. Pt. 2. *Foundry Trade Journal,* v. 104, Mar. 6, 1958, p. 259-269.

Preliminary report of British committee. Plastic lenses afford more protection against both solid and molten metal than do either toughened or laminated glass lenses. (W13k, E-general)

199-W. Combination Gas and Electric Heating in Rotary Hearth Furnace for Treating High Speed Steel Bearing Rings. *Industrial Heating,* v. 25, Mar. 1958, p. 496-499.

(W27, 1-52, T7d; TS-m)

200-W. New Methods in Maintenance of Refractories in Steel Plants: Pt. 4. *Industrial Heating,* v. 25, Mar. 1958, p. 579-584.

Evaluation of cast refractory and brick linings; refractory and installation costs; increase in hot top value during lining life and practicability of using reduced hot tops. Castable replacement costs are 40% less than those using refractory shapes, due to elimination of skilled labor required to brick the tops and through greater utilization of existing nonskilled labor. (W19c; ST, RM-h)

201-W. Arc Image Furnace Produces Temperatures Above 7000° F. *Industrial Heating,* v. 25, Apr. 1958, p. 728-730, 734.

(W18s)

202-W. Instrumentation in Vacuum Induction Melting. *Industrial Heating,* v. 25, Apr. 1958, p. 732-734.

Instrumentation for a 1-ton induction vacuum furnace comprises a small top-charging chamber separated from the main melting chamber by a large horizontal gate valve. (W18a, X-general, 1-73)

203-W. A New Single-Operation Precision Blanking Press. *Machinery (London),* v. 92, Mar. 28, 1958, p. 724-726.

Hydraulic press was developed to produce blanks from sheet or strip metal with an edge finish equivalent to that obtained by shaving or grinding. Precision blanking applied to metals with thicknesses varying from 0.06 to 0.315 in., with output of 600 to 800 pieces per hr. Four sizes have been developed; the latest types have provisions for mounting strip-feeding equipment. (W24g, 1-70, G2h)

204-W. Equipment for Fusion Welding Large Pipes. *Machinery (London),* v. 92, Apr. 4, 1958, p. 785.

(W29, K-general, 1-52; ST, 4-60)

205-W.* Automation of a Barrel Plating Line. *Metal Finishing Journal,* v. 4, Mar. 1958, p. 75-79.

Automatic, independent - cycling machine for Cd barrel plating. (W3b, L17; *Cd,* 18-74)

206-W. Conveyorized Die-Casting Foundry. *Metal Industry,* v. 92, Feb. 14, 1958, p. 127-129.

(W12r; E13; 18-67)

207-W. Electric Furnace Developments. P. F. Hancock. *Metal Industry,* v. 92, Feb. 28, 1958, p. 167-169.

Progress in arc, induction and resistor furnaces. (W17j; W18a; W18s)

208-W. Large Aluminum Plate. *Metal Industry,* v. 21, Mar. 1958, p. 231-234.

Five new pieces of equipment installed in a plant for production and testing large Al plate. (W23b; Al, 4-53)

209-W. Fourslide Press or Progressive Die? J. H. v. d. Burgt. *Sheet Metal Industries,* v. 35, Mar. 1958, p. 165-178.

(W22p, W22a)

210-W. Nozzle Changes Pay Off. *Steel,* v. 142, Apr. 21, 1958, p. 144, 146.

Nozzle material, shape, refractoriness, quality, size and effect of these variables on ingots and the steels rolled from them. (W19e, D9; NM-h, ST, 5-59)

211-W. An Assessment of Various Furnace Linings. Edgar Spetzler. *Stahl und Eisen,* v. 76, Dec. 27, 1956, p. 1734-1740. (Iron and Steel Institute, Translation no. 554.)

Previously abstracted from original. See item 67-W, 1957. (W18, D2g; RM-h)

212-W.* (German.) Modern Melting Practice in the Production of Metals and Alloys of Extremely High Purity. W. Scheibe. *Metall,* v. 11, Oct. 1957, p. 854-859.

In a high-vacuum d-c arc furnace for laboratory use, a water-cooled copper mold is used instead of a crucible. The material to be melted is charged through a self-consuming electrode, which is fed automatically, maintaining a constant arc. A stirring motion can be created through an electric coil around the outside of the mold. The output of the furnace can be regulated between 3 and 4 kg. per min. 3 ref. (W18s, X24f, 1-73)

213-W. (German.) Choice of Steels for Molds and Hot Working Dies for Centrifugal Casting. J. Klarding. *Metall,* v. 12, Jan. 1958, p. 12-20.

With carbon steels the hardening process can be repeated more times before cracking than with alloy steels; the aluminum content has a bearing on the number of repeated hardenings until brittle. 4 ref. (W19g, W19n, 17-57, E14; ST)

214-W. Change-Over of O. H. Furnaces From Oil to Natural Gas Firing. V. P. Borodin. *Stal',* no. 2, 1957, p. 124-129. (Iron and Steel Institute, Translation no. 538.)

Previously abstracted from original. See item 479-W, 1957. (W18r, 1-52, RM-m35; ST)

215-W. Use of High-Alumina Bricks in Hot Blast Stoves. A. I. Kulik *Stal',* no. 7, 1956, p. 582. (Iron and Steel Institute, Translation no. 551.)

Previously abstracted from original. See item 176-W, 1957. (W17; Fe, RM-h)

216-W. Behavior of the Surface of Rolls in Rolling. Wilhelm Hesse. *Stahl und Eisen,* v. 77, May 30, 1957, p. 715-727. (Iron and Steel Institute, Translation no. 583.)

Previously abstracted from original. See item 286-W, 1957. (W23k, 17-7; ST, 9-71, 9-72)

217-W. Economic and Technical Results of Operation of Waste-Heat Boilers and High-Temperature Cooling Plants Installed on O. H. Furnaces. Max Zur. *Stahl und Eisen,* v. 77, Jan. 24, 1957, p. 95-100. (Iron and Steel Institute, Translation no. 584.)

Previously abstracted from original. See item 111-W, 1957. (W10, 18-67, 17-53)

218-W. Practical Experiences With and Damage Sustained by Waste-Heat Boilers and High-Temperature Cooling Plants for O. H. Boilers. Werner Heil. *Stahl und Eisen,* v. 77, Jan. 24, 1957, p. 84-91. (Iron and Steel Institute, Translation no. 611.)

Previously abstracted from original. See item 109-W, 1957. (W10, 18-71)

219-W. Method of Cleaning the Waste-Heat Boiler Installed on an O. H. Furnace. Paul Jacobi. *Stahl und Eisen,* v. 77, Jan. 24, 1957, p. 91-95. (Iron and Steel Institute, Translation no. 612.)

Previously abstracted from original. See item 110-W, 1957. (W10, 18-71)

220-W. Experiences With the Application of Basic Brickwork in O. H. Furnaces. Karl Leitner. *Neue Hutte,* v. 2, Feb-Mar. 1957, p. 142-154. (Iron and Steel Institute, Translation no. 615.)

Previously abstracted from original. See item 294-W, 1957. (W18r, 1-52; RM-h)

221-W. Hot Cooling of Openhearth Furnaces. S. I. Moiseyevich. *Stal',* no. 7, July 1957, p. 658-682. (Iron and Steel Institute, Translation no. 691.)

Previously abstracted from original. See item 485-W, 1957. (W18r, W11; ST)

222-W. Continuous Wire Rolling Train at the Wendel Plant at Jouef. J. Boulange and M. Blau. *Technique Moderne,* v. 49, July 1957, p. 63-65. (Iron and Steel Institute, Translation no. 751.)

Previously abstracted from original. See item 457-W, 1957. (W24k, 1-52)

223-W. Continuous Wire Mill of the Societe Metallurgique de Normandie. L. Boulez. *Technique Moderne,* v. 49, July 1957, p. 66-69. (Iron and Steel Institute, Translation no. 752.)

Previously abstracted from original. See item 458-W, 1957. (W24k, 1-52)

224-W. Montataire Works of Usinor. Continuous Pickling Line; New Four-Stand Mill; Annealing Plant; Skin Pass Mill. M. Mallet. *Technique Moderne,* v. 49, July 1957, p. 87-93. (Iron and Steel Institute, Translation no. 756.)

Previously abstracted from original. See item 462-W, 1957. (W23f, 1-52)

225-W. New Developments in Furnace Construction for Drop Forgings. E. Pflaume. *Fertigungstechnik,* v. 7, Feb. 1957, p. 63-64. (Iron and Steel Institute, Translation no. 868.)

Previously abstracted from original. See item 322-W, 1957. (W20h, 1-52, F22n)

226-W. (Czech.) **Interchangeable Time Regulating Panels for Asynchronic Control of Spot Welding Machines.** Karel Jarsky. *Zvaranie,* v. 7, Feb. 1958, p. 40-43.

(W29c, K3n)

227-W. (French.) **13,200-Ton Extrusion Press at Madison's Magnesium Plant.** Andre Chevrier. *Revue de l'Aluminium,* v. 35, Feb. 1958, p. 197-201.

New powerful and complex equipment to extrude large-size Mg shapes with integrated stiffeners for aircraft industry. (W24g, F24, T24a; Mg)

228-W. (Russian.) **Use of Carbon Blocks in Construction of Blast Furnace.** A. N. Red'ko. *Metallurg,* Jan. 1958, p. 7-10.

(W17g; RM-h39)

229-W. (Russian.) **Cooling Blast Furnace Tuyeres by Evaporation.** B. I. Ragin. *Metallurg,* Jan. 1958, p. 10.

(W17g, W10f)

230-W. (Russian.) **More Effective Control of Temperature of Blast Heaters.** P. G. Baranovskii. *Metallurg,* Jan. 1958, p. 11-12.

(W17g, S16)

221-W. (Russian.) **Machine for Cleaning Tin Plate.** M. I. Udovenko. *Metallurg,* Jan. 1958, p. 30-32.

(W3d, L12; *Sn,* 8-15)

232-W. (Russian.) **Improvements in Blast Furnace Charging Apparatus.** L. Ya. Matusevich. *Metallurg,* Feb. 1958, p. 5-7.

(W17g, D1a)

233-W. (Russian.) **Casting Molds of New Construction.** A. S. Korzhavin. *Metallurg,* Feb. 1958, p. 18-19.

(W19c)

234-W. (Russian.) **Modernization of Gear Drive for Rolling Mills.** S. M. Ruvinskii, I. S. Starets and D. I. Shulyatskii. *Metallurg,* Feb. 1958, p. 24-26.

(W23n)

235-W. (Russian.) **Equipment of Rolling Mills With Chromium-Plated Grooves.** M. A. Tylkin. *Metallurg,* Feb. 1958, p. 27-28.

(W23k; *Cr,* 8-62)

236-W. (Russian.) **Use of Hard Metals in Punch Press Construction.** S. S. Chetverikov and N. K. Foteev. *Vestnik Mashinostroeniya,* Feb. 1958, p. 40-42.

Reinforcing presses with hard metal gives much greater strength than construction with toolsteels. (W24g, 17-57; EG-d37)

237-W. Applications of Furance Atmospheres. Pt. 4. C. E. Peck. *Industrial Heating,* v. 25, Feb. 1958, p. 258-268.

Features of furnaces used with controlled atmospheres emphasizing importance of proper correlation between furnace design and application. (W27n, J2k)

238-W. New Methods in Maintenance of Refractories in Steel Plants. Pt. 3. *Industrial Heating,* v. 25, Feb. 1958, p. 355-360.

Abstracts of papers presented at Refractories and Masonry Session I, 40th National Open-Hearth Conference, AIME, Pittsburgh, Apr. 8-10, 1957, dealing with performance of different types of pouring nozzles. (W18n, W18r; RM-h, 18-71)

239-W. Trends in Steel Mill Power Plants. Howard G. Kitt and Robert W. Worley. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 90-97.

Recent development of power plants indicates trend toward higher pressures and temperatures, larger capacity and more efficient equipment. (W11, 1-52; ST)

240-W. Electrical Drive System for a High-Speed Combination Rod Mill. A. F. Kenyon and H. J. Oakes. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 123-136.

Power system for rod mill; rapid response to operator control and to load changes; accuracy with which speed and other variables can be maintained. (W23n, W23d)

241-W.* Development of Automatic Thickness Controls for Strip Mills. I. G. Orellana. *Iron and Steel Engineer,* v. 35, Mar. 1958, p. 144-150.

Automatic control for hot strip mills is still being developed, but good results are being obtained. 96% of strip produced at one mill has within ±½% of nominal thickness. (W23c, X20c)

242-W. Handling Titanium Ingots. *Light Metals,* v. 21, Feb. 1958, p. 56-57.

Electric power pilot truck with attachments for handling Ti ingots. (W12n, 1-52; Ti, 5-59)

243-W. Electric Furnace Developments: Review of Progress in Arc, Induction and Resistor Furnaces. P. F. Hancock. *Metal Industry,* v. 92, Mar. 1958, p. 187-189.

(Concluded.) (W27j, W27k)

244-W. Radio-Frequency Induction Heaters. R. P. P. Ellis. *Metal Treatment and Drop Forging,* v. 25, Apr. 1958, p. 145-147, 156.

(W28s)

245-W. Machine Tool Progress. George F. Nordenholt. *Ordnance,* v. 42, Mar-Apr. 1958, p. 910-913.

(W25)

246-W. Aluminum Welding Cable. J. G. Stone. *Welding Journal,* v. 37, Apr. 1958, p. 320-327.

Electrical and physical properties, advantages of Al welding cable. (W29q, 17-57; Al-b, 4-60)

247-W. Frequency-Converter Welding Control Using Counting Tubes. L. R. Broniak and W. A. Chaisson. *Welding Journal,* v. 37, Apr. 1958, p. 336-341.

(W29c, X13j, K3n)

248-W. Practical Welder and Designer. Manipulator for Automatic Welding. Harry S. Powell. *Welding Journal,* v. 37, Apr. 1958, p. 359-361.

(W29k)

249-W. (German.) **Molding Machines for Pressure Casting. Contribution to the Choice of Materials and Heat Treatment of Pressure Casting Machines.** *Giessereitechnik,* v. 4, Jan. 1958, p. 7-10.

(W19f)

250-W. (German.) **Continuous Pusher-Type Heating Furnace With Fully Automatic Control and Ceramic Skid Rails.** Fritz Fechter. *Stahl und Eisen,* v. 78, Mar. 6, 1958, p. 299-303.

(W20h, F21b)

251-W. (Japanese.) **Extension Die With Movable Wall.** Mahito Kunogi. *Japan Society of Mechanical Engineers, Transactions,* v. 23, Oct. 1957, p. 757-763.

The movable wall can not only reduce friction, but also can form shells in various shapes—screw, gear and cone, in one operation. 5 ref. (W24n, F24b)

252-W. (Russian.) **Rebuilding Continuous Furnaces.** P. K. Kuznetsov and Y. Ya. Klassen. *Metallurg,* Feb. 1958, p. 28-29.

(W17, W18, W27, 1-61, 18-72)

253-W. (Russian.) **Modern Pilger Mills.** Iu. M. Matveev. *Stal',* Feb. 1958, p. 151-155.

5 ref. (W23h)

254-W. (Russian.) **Die Steels and Presses Used for Drop Forging.** A. S. Nikolaev. *Stal',* 1958, p. 162-163.

(W22q, W22a, 17-57; TS)

255-W. (Russian.) **Improvement of Drawing Tools.** A. I. Bogdashkin. *Stal',* Feb. 1958, p. 169-170.

(W24n)

256-W. (Russian.) **Technical Development of Heating Facilities of Rolling Mills.** K. M. Golosman. *Stal',* Feb. 1958, p. 171-178.

(W10e, W23)

257-W. (Russian.) **Cast Steel Rolls for Rolling Mills.** V. N. Saveiko and

M. V. Frolova. *Stal'*, Feb. 1958, p. 179-184.

11 ref. (W23k, 17-57; ST, 5-60)

258-W. (Russian.) Ceramic Semiconductor Heaters in Electric Furnaces. A. Ya. Kuznetsov, L. A. Pafomova and L. M. Kalinina. *Zavodskaya Laboratoriya*, v. 23, no. 12, 1957, p. 1497-1498.

(W27k, W27p)

259-W. Transformers for Electric Furnaces. William M. Bogert. *Blast Furnace and Steel Plant*, v. 46, Apr. 1958, p. 377-378, 388.

(W18s, W11r, 1-52)

260-W.* Heat-Exhangers. E. Longden. *British Foundryman*, v. 51, Apr. 1958, p. 193-197.

Hot blast cupola-type furnaces allow more precise control of metal; increased efficiency derived from the use of heat-exchangers; two designs described. (W13b, W18d, 1-52)

261-W. Cold Rolling Mill for Very Thin Strip. *Engineer*, v. 205, Feb. 21, 1958, p. 272-274.

Use of an ordinary two-high rolling mill with a simple insert mill to roll nickel-iron tapes. (W23f; 4-53)

262-W. Ductile Iron in the Machine Tool Industry. Robert M. Bronson. *Inco*, v. 27, Apr. 1958, p. 11-15.

Mechanical properties, endurance, strength and rigidity, machinability, wear resistance, pressure tightness and flexibility of design. (W25, 17-57; Q-general; CI-r)

263-W. Assessment of Heating Requirements for Metal Finishing Process Tanks. H. C. Hickman. *Metal Finishing*, v. 4, Apr. 1958, p. 123-126.

(W3j, S16, L12, L17a)

264-W. Rolling Mill Drives. Some Recent Electrical Installations. *Metallurgia*, v. 57, Apr. 1958, p. 189-192.

(W23n, 1-52)

265-W. Process Controls for Making Turbine Castings. *Mechanical Engineering*, v. 80, Apr, 1958, p. 61-63.

(W11n, 17-57; 5-60)

266-W. British Nuclear Energy Developments. John Cockroft. Digest of paper presented at meeting of Dutch Engineering Society, Feb. 1957. *Metal Progress*, v. 73, May 1958, p. 140-144.

Theory and practice underlying the United Kingdom Calder Hall nuclear power station and the Dounreay reactor. (W11p)

267-W. Titanium-Tipped Anodizing Work Racks Require No Stripping. *Products Finishing*, v. 22, May 1958, p. 74, 76, 78.

Titanium work holders mounted on Al work racks. Ti is not affected by the anodic process, its surface conductivity remains constant, and no "stripping" between loads is necessary. (W3g, 17-57; Ti)

268-W. Snap Hearth Unit Cuts Manhours, Fuel Costs on Small Parts. Leo Wartenberg. *Western Metalworking*, v. 16, Apr. 1958, p. 57-58.

Snap hearth furnaces for mechanized heat treating of small parts. (W27p, 1-52)

269-W. Use of Carbonaceous Refractories in Bottom and Wall of Hearth of Blast Furnaces. P. I. Lokshin and G. P. Moshkina. *Stal'*, v. 16, no. 2, 1956, p. 108-114. (Henry Brutcher, Altadena, Calif., Translation no. 3875.)

(W17g; RM-h39)

270-W. Experience Gained in Many Years of Operating a Hot-Metal Mixer. G. N. Susakin. *Stal'*, v. 16, no. 5, 1956, p. 465-467. (Henry Brutcher, Altadena, Calif., Translation no. 4018.)

Transfer ladle design developed for minimum heat losses and skulling. (W18n, 1-52; ST)

271-W. Molten Metals or Alloys as Heat Treating Media for Steel. A. P. Garashchenko, A. P. Gulyaev and Z. S. Luneva. *Metallovedenie i Obrabotka Metallov*, no. 1, Jan. 1958, p. 21-24. (Henry Brutcher, Altadena, Calif., Translation no. 4119.)

Aluminum and its alloys as substitutes for toxic and much more expensive Pb baths for the heat treating of steel. (W28p, 17-57; ST, Al, 14-60)

272-W. Basics of Development for Crane Bridges. Karl Eckinger. *Stahl und Eisen*, v. 77, Jan. 10, 1957, p. 15-23. (Iron and Steel Institute Translation no. 922.)

Previously abstracted from original. See item 105-W, 1957. (W12q, 17-57, Q1, 1-54; ST)

273-W. Torsion-Proof Box-Girders in the Construction of Mill Cranes. Heinz Schwarz. *Stahl und Eisen*, v. 77, Jan. 10, 1957, p. 24-32. (Iron and Steel Institute Translation no. 923.)

Previously abstracted from original. See item 106-W, 1957. (W12q, 17-57, 17-51; ST)

274-W. (English.) Nodular Cast Iron Piston Rings With a Ferritic Matrix.

Traian Dumitrescu and Pascal Popescu. *Revue de Métallurgie (Bucarest)*, v. 2, 1957, p. 83-90.

Nodular iron piston rings have a number of advantages, such as greater elasticity, absence of internal stresses, resistance to wear, and others, over those of cast iron alloyed with Cr, Ni, Mo and W. 9 ref. (W11j; CI-r, 17-57)

275-W. (French.) **Contribution to the Study of Rolling Mill Equipment. Pt. 2. Rolling Mills. V. Bar Mills and Merchant Mills.** G. Grenier. *Echo des Mines*, no. 3514, Mar. 1958, p. 159-160.

(To be continued.) (W23d, 1-52)

276-W. (French.) **Foundry Equipment and Layout.** *Journal d'Informations Technique des Industries de la Fonderie*, no. 93, Jan-Feb. 1958, p. 9-11.

(W19, 1-52, 18-67)

277-W. (German.) **Ingot Mold Dryer With Hot Air Circulation.** *Werkstatt und Betrieb*, v. 91, May 1958, p. 242.

New gas-heated dryer for foundry work. (W19k, 1-52)

278-W. (Russian.) **Automatic Heat Control of Hot Blast Stoves.** L. V. Brodetzkii and P. G. Pikalov. *Stal'*, Jan. 1958, p. 21-22.

(W17g)

279-W. (Russian.) **Increasing Lining Life in Electric Furnaces.** O. F. Antropov and N. V. Sidorov. *Stal'*, Jan. 1958, p. 48-49.

(W17j; RM-h)

280-W.* (Russian.) **Improved Annealing of Structural Steel in Mechanically Charged Batch Furnaces.** M. I. Kolosov, I. Ya. Aizenshtok and A. I. Komissarov. *Stal'*, Jan. 1958, p. 71-74.

Batch furnaces with mechanical charging of piles for annealing structural steel have higher production rate than those with slide-hearths. They have combustion chambers under the hearths and auxiliary apertures for recirculating hot gases. Fuel economy, prevention of local overheating, and uniform heating of the charge are some of the advantages. (W27, 1-62, J23; ST)

281-W. (Russian.) **New Rolling Mills in England.** A. I. Tselikov and A. A. Korolev. *Vestnik Mashinostroeniya* Mar. 1958, p. 72-77.

(W23)

282-W. (Spanish.) **Electrical Equipment Used in Continuous Rolling of Silicon Strip.** G. J. Hay and H. S. Fegely. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 111-127.

Technique used in process; tensile stress, velocity and temperature used; a 1000-kva. and 6600-volt electric furnace controlled by magnetic amplifier regulator; results obtained. (W23c, W23n, 1-52, AY, *Si*)

283-W. (Spanish.) **Rectifier Characteristics and Application in Steel Industry.** J. R. Moran. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 153-181.

Mercury rectifier; advantages and disadvantages; costs and comparison with the motor generator type; choice on basis of initial and operating cost and power supply. Constant and adjustable voltage regulators; copper oxide, selenium and germanium rectifiers; applications. (W11q, 1-52; ST)

284-W. (Spanish.) **Operation of a Rolling Mill With Modernized Electric Controls.** E. B. Fitzgerald and Eric Pell. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 233-246.

(W23n, 1-52; ST)

285-W. (Spanish.) **Basic Materials Used in Openhearth Furnace Construction and Maintenance.** Guillermo Gomez Colmenares. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 247-249.

(W18r, 1-57; ST)

286-W. (Spanish.) **Secondary Reactances in Electric Arc Furnace Circuits.** Raymond Arias. Paper from *Second National Congress of the Steel Industry*, Mar. 1957, p. 271-273.

(W18s, 1-52; ST)

287-W. Lubrication in Rolling Mills. New Designs for Maximum Efficiency. S. L. Norton. *Iron and Coal Trades Review*, v. 175, Nov. 8, 1957, p. 1097-1098.

(W23, 17-51, 18-73)

288-W. Mechanical Handling Equipment for Motor Car Body Stampings. J. Nieminen. *Machinery (London)*, v. 92, Feb. 28, 1958, p. 478-481.

(W12, G3, T21a; ST, 4-53)

289-W. Induction Heating. A. Dixon. *Tool Engineer*, v. 40, Mar. 1958, p. 84-86.

Development of flexible cables and lightweight induction coils makes portable units possible for brazing and selective heating. (W28s, W29n)

290-W.* (German.) **Energy Absorption of a Graphite Bar and Current Con-**

sumption of Graphite Bar Furnace. Karl Wagner. *Giesserei,* v. 45, Mar. 27, 1958, p. 173-175.

Course of energy absorption during melting. Most important factor influencing total monthly current consumption is weight of single charge. Maximal furnace capacity must be fully used. (W18s, 16-61)

291-W. (Italian.) Theory of the Cupola Furnace. W. Patterson. *Fonderia;* v. 7, Jan. 1958, p. 13-19.

Static picture of the cupola furnace. The dynamic process, behavior of the iron, of the coke, and of the combustion air. Theoretical possibilities of influencing the melt. (W18d, E10a)

292-W. (Russian.) Modernization of Equipment in Sheet Mills. A. P. Koshka and V. A. Brusilovskii. *Metallurg,* v. 3, Mar. 1958, p. 27-28.

(W23c, 18-74; ST)

293-W.* The Use of Heat Resisting Steels in the Construction of High-Temperature Heat Exchangers. *Aciers Fins & Speciaux,* no. 28, Mar. 1958, p. 65-70.

Steels used most frequently contain 5% Cr, 0.5% Mo; 7% Cr, 0.5% Mo, 0.3% V; 13% Cr, 1.5% Si; 24% Cr, 1.8% Si; 25% Cr, 20% Ni; carbon content of these steels is systematically kept low, about 0.10 to 0.12%. Stainless steels of 18-8 type and steel containing 25% Cr and 12% Ni are sometimes used.
(W13b, 17-57; SS, SGA-h)

294-W. High-Boron Steels for Nuclear Reactors. *Australasian Manufacturer,* v. 43, Apr. 26, 1958, p. 54-62.

(W11p, Q-general, 17-57; AY, *B*)

295-W. Tests on a Four-High Reversing Cold Strip Mill. Obering H. Bischoff and K. H. Spiller. *Demag News,* no. 145, 1956, p. 17-22.

Power requirements, strip tension, roll forces and gage variations.
(W23c)

296-W. Modern Four-High Universal Reversing Mill for Heavy and Medium Plate. W. Mullenbach. *Demag News,* no. 146, 1956, p. 25-33.

(W23b)

297-W. Metallurgy Makes the Difference. Fred G. Sefing. *Diesel Power,* v. 35, Nov. 1957, p. 35-39.

Role of metallurgist in quenching temperature and pressure problems in high output engines.
(W11j, 17-57; SGA-h)

298-W. Wire Rod Mill Layout. *Wire Industry,* v. 25, May 1958, p. 469-470.

Small mill rolling angle irons and T-sections as well as wire rods. (W23d, 18-67)

299-W. Design and Performance of Hydraulic Descaling Plants. Wolfgang Berns. *Stahl und Eisen,* v. 77, May 2, 1957, p. 567-576. (Iron and Steel Institute Translation no. 542.)

Previously abstracted from original. See item 210-W, 1957.
(W23, 1-72, L10g)

300-W. New Methods of Hot Cooling. Rudolf Vonnemann. *Stahl und Eisen,* v. 77, Aug. 22, 1957, p. 1126-1134. (Iron and Steel Institute Translation no. 684.)

Previously abstracted from original. See item 14-W, 1958.
(W10f, 1-52)

301-W. Location of Blast-Furnace Mixing Valve. N. Chernov. *Stal',* May 1957, p. 389-391. (Iron and Steel Institute Translation no. 690.)

Previously abstracted from original. See item 4-W, 1958.
(W17g, 1-52; RM-h, Fe)

302-W. Possibilities of Standardizing the Drives of Steelworks Cranes. Albrecht Wolf. *Stahl und Eisen,* v. 77, Jan. 10, 1957, p. 33-36. (Iron and Steel Institute Translation no. 798.)

Previously abstracted from original. See item 107-W, 1957.
(W12q, 17-57, T7; ST)

303-W. The Hydrocyclone as Part of the Water Circulation System in an Integrated Steelworks. Alfred Kohler. *Stahl und Eisen,* v. 78, Feb. 20, 1958, p. 235-239. (Iron and Steel Institute Translation no. 893.)

Previously abstracted from original. See item 172-W, 1958.
(W10h, ST)

304-W. The Full Continuous Strip Mill of Messrs. Wuppermann. Heinrich Lampmann. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 160-167. (Iron and Steel Institute Translation no. 899.)

Previously abstracted from original. See item 155-W, 1958.
(W23c, F23, 1-61)

305-W. (French.) The Atomic Age Presents Steel With a Challenge. Edward A. Livingstone. *Metallurgie et la Construction Mecanique,* v. 90, May 1958, p. 361-363, 365, 367, 369.

(W11p, 17-57; ST)

306-W. (German.) **Austenitic Steel Castings for the Construction of Gas and Steam Turbines.** W. Stauffer and A. Keller. *Giesserei,* v. 45, Apr. 1958, p. 229-239.
5 ref.
(W11k, W11m, 17-57, Q23, SS-e, 5-60)

307-W. (German.) **Nonoxidizing Hardening Furnace for High Speed Steel Tools.** N. K. Koebel. *Werkstatt und Betrieb,* v. 91, Apr. 1958, p. 171-172.
Preheating, high-temperature and quenching stages combined into one unit. (W27n, J26; TS)

308-W. (German.) **New Metal-Bonded Diamond Grinding Wheel.** *Werkstatt und Betrieb,* v. 91, Apr. 1958.
(W25c)

309-W. (German.) **A Cutting Torch for Maximum Cutting Powers for Extremely Thick Workpieces.** *Werkstatt und Betrieb,* v. 91, Apr. 1958.
(W29d, G22g)

310-W. (German.) **Easy Portable Open-Type Mold Drying Oven.** *Werkstatt und Betrieb,* v. 91, Apr. 1958.
(W19k)

311-W. (Russian.) **Pneumatic Conveyors for Molding Mixtures.** V. M. Korchemkin, Yu. O. Rapoport and A. A. Gaidukov. *Liteinoe Proizvodstvo,* v. 2, Feb. 1958, p. 12-13.
(W19h)

312-W. (Russian.) **Durability of Unburned Magnesite-Chromite Bricks in Openhearth Roofs.** E. M. Tsygankov and M. F. Ratnikov. *Stal',* v. 18, Apr. 1958, p. 317-319.
(W18r; RM-h)

313-W. Selection of Arc Furnace Transformers With Consideration to Maintenance. E. G. Ashbaugh. *Blast Furnace and Steel Plant,* v. 46, May 1958, p. 478-481, 488.
(W11r, 2-52, D5)

314-W. Automation in Heating and Quenching. Pt. 2. Norbert K. Koebel. *Industrial Heating,* v. 25, May 1958, p. 908, 910, 912, 914, 916.
Equipment for automating the heating and quenching of very large bulky parts, such as landing gear components, jato tubes for guided missiles and similar parts in the aircraft industry. Automation is applied to control of furnace atmosphere as well as to material handling. (Concluded.)
(W27, W12, 18-74)

315-W. Fume Problem of Basic Oxygen Steelmaking Process Solved by Electrostatic Precipitation. *Industrial Heating,* v. 25, May 1958, p. 962, 964.
Cottrell electrostatic precipitator, operating with an efficiency of 99.5%, is the first commercial application of an electrostatic precipitator to clean exhaust gases from an oxygen converter. (W13c, D10)

316-W. Rolling Mill Slippers: Design. F. J. Gleve. *Iron and Steel Engineer,* v. 35, May 1958, p. 127-128.
(W23, T7d, 17-51; Cu-s)

317-W. Rolling Mill Slippers: Materials. R. J. Severson. *Iron and Steel Engineer,* v. 35, May 1958, p. 129-130.
(W23, T7d, 17-57; Cu-s)

318-W. Design of Press Structures. Pt. 2. Tie Rod Shrinking. *Modern Industrial Press,* v. 20, May 1958, p. 31-34.
Theory of tie rod shrinking and relationship between stresses in tie rods and parts of the press frame. Details for shrinking and methods for heating tie rods. (W24g; 17-51)

319-W. (Italian.) **Proper Cupola Design.** Ottavio Barbavara di Gravellona. *Rivista di Meccanica,* v. 9, Mar. 15, 1958, p. 29-32.
(W18d, 17-51)

320-W.* (Japanese.) **A Permanent Wall-Type Furnace With Forced Cooling, Water-Cooled Basic Cupola.** Ryozo Sato. *Japan Foundrymen's Society, Journal,* v. 30, Mar. 1958, p. 152-158.
Basic practice can be operated by the application of water cooling method to melting zone of the cupola which has been lined with thin basic material. (W18d)

321-W. Plastic Tooling Opens New Markets. *Metal Forming and Fabricating,* v. 20, June 1958, p. 17-19.
Phenolics, polyesters and epoxies are being more widely used as dies. Advantages include low shrinkage, good machinability, high chemical resistance, excellent adhesion, low cost. (W24n, NM-d30)

322-W. The All-Basic Openhearth. *Metal Progress,* v. 73, June 1958, p. 85-87.
With hearth and walls already being constructed of basic material, the only area left to complete the all-basic openhearth is the roof.

Work conducted by American and British steelmakers over the last few years indicates that higher production and longer roof life can be expected when problems imposed by the use of basic brick are solved. (W18r, D2, 1-65; RM-h, ST-e)

323-W. Processing With Continuous Heating. An Economic Appraisal. Frederic O. Hess. *Metal Progress,* v. 73, June 1958, p. 99-105.

The continuous furnace should be thought of as a processing tool. Many factors in its design and operation require a realistic appraisal. For example, rating a furnace on fuel efficiency and fuel costs can be deceptive. Most continuous furnaces today are not single-purpose devices and this must be considered in their evaluation. (W20h, W27, 1-61)

324-W. A New Approach to Open Hearth Maintenance. E. W. Hunziker and M. E. Strate. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 110-120.

Prefabricating an entire openhearth furnace and moving it into position results in less downtime, saving labor and money. (W18r, 18-71)

325-W. Prefabricating New Fronts for Open Hearth Furnaces Saves Time and Money. A. W. Schoenbeck. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 129-138. (W18r)

326-W. Patching an Open Hearth Roof. C. L. Meloy. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 138-146. (W18r; RM-h)

327-W. Progress Report on Basic Construction. A. H. Sommer. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 175-179. (W18r, 1-65; ST)

328-W. Progress Report on Flat Basic Roof Installation. J. F. Pollack. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 180-183. (W18r, 1-65; ST, RM-h)

329-W. Progress Report on All-Basic Roofs at Laclede Steel Co. L. D. Yager. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 183-184. (W18r, 1-65; ST, RM-h)

330-W. Progress Report on Flat Basic Open Hearth Roof at Inland Steel Co. P. W. Nutting. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 184-190. (W18r, 1-65; ST, RM-h)

331-W. Use of Basic Refractories for Open Hearth Roofs and Checkers. C. W. Cravens. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 191-207.

Use of electrocast brick gives results somewhat similar to those of conventional metal-encased brick in combination with silica brick. The initial trial of basic checkers was unsatisfactory because of excessive spalling. (W18r, 1-65; ST, RM-h)

332-W. Use and Economics of Basic Runners. Anthony R. Edwards. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 219-225.

Basic runners are far superior to the brick runners in point of service and they operate at a great economic saving. (W18r, D9n; RM-h)

333-W. Mechanical Aids to Openhearth Repairs. M. H. Weir. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 226-230.

Large materials handling machinery reduces downtime during repair work. (W18r, W12, 18-72)

334-W. Advantages of an All-Basic Furnace in a Cold-Metal Shop. Lewis B. Lindemuth. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 230-235.

Advantages with basic roof and basic end construction, contrast with the previous general silica construction on the 175-ton openhearth furnaces. (W18r, 1-65; ST, RM-h)

335-W. Experiments With Fuel-Fired Jet Atomizing Fuel-Oil Burners. William Wood. *National Open Hearth Steel Committee Proceedings,* v. 40, 1957, p. 241-244.

Results demonstrate possibilities for improving combustion and increasing openhearth production. (W18r; RM-k30)

336-W. (German.) Use of Hard Metals for Punch Construction. G. Viereggе. *Das Industrieblatt,* v. 58, Apr. 1958, p. 129-132.

Economic expediency and limits of application. Construction of the punches; maintenance and resharpening. Suitable hard metals. Equipment for manufacturing punches. Applications and experiences. (W24p; 17-67; 6-69)

337-W. (German.) Importance of Jigs for Punches and Dies in Forming of

Sheets. Kurt Venninger. *Das Industrieblatt,* v. 58, Apr. 1958, p. 133-135.

Influence of stamping regularity on the durability of tools. Construction of plate jig and column jig, their applications and advantages Use of low melting alloys for repairing or manufacturing jigs designed for temporary application. (W25f, G1; SGA-d)

338-W.* (Italian.) **Design and Specifications for a Special Furnace for Austenitizing Stainless Steel Sheet.** I. Montevecchi. *Metallurgia Italiana,* v. 50, Feb. 1958, p. 53-58.

Differential calculus was used to plan automated installation for treating large sheets of 18-8 and 20-25 Ni-Cr alloy. Installation includes conveyor system which handles materials by means of holes bored near edges, thus avoiding contact by any equipment with surfaces of sheet. Bored areas are removed by subsequent machining, which would be required in any case. (W27, W12r, 1-52, J22; SS, 4-53)

339-W. (Rumanian.) **Selenium, a Product New to the Rumanian Chemical Industry.** A. Blankenburg. *Revista de Chimie,* Feb. 1958, p. 96-98.

Use of Se in electrolytic refining of Cu and other metals. 4 ref. (W17e, 17-57; Se, *Cu*)

340-W. Big Billets. *Aircraft Production,* v. 20, May 1958, p. 186-191.

Installation of heavy equipment by Northern Aluminum for the production of plate for large integral airframe units. (W22, W27, T24a; 4-53)

341-W.* Barrelling. Preshaped Synthetic and Metal Chips. *Aircraft Production,* v. 20, June 1958, p. 210-214.

Synthetic preshaped chips for doing work on surfaces in restricted situations without risk of lodgement; and the use of shaped metallic media. (W2a, L10c, 1-52)

341-W. A 40-Ton Arc Melting Furnace With Modern Electrical Equipment. R. Lambert. *Brown Boveri Review,* v. 45, Feb. 1958, p. 88-94. (W18s, 1-52; ST, RM-p)

343-W. Flap-Type Coated Abrasive Wheels. Morroy Patterson. *Grinding and Finishing,* v. 4, June 1958, p. 30-38.

Polishing element is a series of coated abrasive leaves and flaps. The flaps are arranged in a circle to form a wheel. (W25c)

344-W. Four-High Skinpass Mill and Electric Equipment to Nihon Teppan Co., Ltd. Hideyuki Yamamoto, Katsumi Fumiki, Masataka Nishi, Hideo Iwaki and Isamu Shiraki. *Hitachi Review,* v. 7, Mar. 1958, p. 3-13. (W23c)

345-W. Modern Iron and Steel Plants. Layout, Handling, Power, and Costs. Paul Rheinlander. *Iron and Coal Trades Review,* v. 176, May 30, 1958, p. 1261-1267. (From *Stahl und Eisen,* Jan. 9, 1958). (W10, W11, D-general, 17-53)

346-W. Oxygen-Refining in the Open Hearth. *Iron and Coal Trades Review,* v. 176, May 30, 1958, p. 1279-1281.

Design and use of an oxygen "gun" for decarburization of mild steel heats at the Steel Co. of Wales. (W18g, D2g, 1-52)

347-W. Linings for Hot Metal Mixers. F. H. McRitchie. *Refractories Institute, Technical Bulletin,* no. 98, Nov. 1957, 12 p.

Important design and service factors affecting life of hot metal mixer and car linings. 29 ref. (W18n; ST, RM-h)

348-W. Developments in the Use of Refractories at the Abbey Melting Shop of The Steel Co. of Wales Ltd. G. M. Workman. *Refractories Journal,* v. 34, May 1958, p. 204-222. (W18r; NM-h38)

349-W. A Survey of General and Specialized Machine Tools for Press-Tool Production. J. A. Waller. *Sheet Metal Industries,* v. 35, June 1958, p. 429-438.

(To be continued.) (W25, W24)

350-W. 18 Ways to Move Parts in a Furnace. Donald Beggs. *Steel,* v. 142, June 23, 1958, p. 90-91.

Devices that are being used in automated heat treating lines. (W12q, W12r, W27p, 1-52)

351-W. What to Look for in Abrasive Belt Machines. J. Karl McLaughlin. *Tool Engineer,* v. 40, June 1958, p. 85-90. (W25s, 1-52)

352-W. (German.) **Two-Zone Heating and Holding Furnace for Light Metal Rolling Ingots, With Oil Firing and Waste Gas Recirculation.** P. Eckhoff. *Aluminium,* v. 34, May 1958, p. 263-265. (W20h, 1-52; Al, 5-59)

353-W.* (German.) **Sand Compression by Jolting.** Waldemar Gesell. *Giesserei,* v. 45, May 22, 1958, p. 295-300.

Description of test machine; compressed air consumption per number of jolts; mold hardness in relation

to jolting duration, operating air pressure and height of molding box; jolting with postcompression; flaskless molding using jolting machines. (W19h, E18r)

354-W. (German.) **Waste Heat Utilization on Three-Flamed Furnaces in Lead Works.** Wilfried Wiese. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, May 1958, p. 217-219.
(W17g, A11e, 1-52; Pb)

355-W. (German.) **Recuperators for Gas Heated Aluminum Melting Furnaces.** Hans-Walter Fulda. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, May 1958, p. 219-221.
(W18r, 1-52; Al)

356-W.* (Russian.) **Experience in Using Fourth Winding of Booster in Electric Furnace Regulator.** B. F. Delaveridi and M. M. Flaksman. *Stal',* v. 18, May 1958, p. 425-427.
Automatic feed of electrodes of melting arc furnace during rapid disturbances of process using fourth control winding of standard booster. Scheme using titration. Scheme using maximal relay. (W18s)

357-W. New Plant at Shepcote Lane Rolling Mills. *British Steelmaker,* v. 24, June 1958, p. 182-185.
Modern plant for production of wide stainless steel strip includes Sendzimir cold mill, 35 x 72 in., 2-high reversing roughing mill, reversing hot finishing mill now converted to a Steckel mill, and 4-high reversing cold reduction mill.
(W23c, 1-52; ST)

358-W. Mercury Arc Converters for Large Reversing Drives. *British Steelmaker,* v. 24, June 1958, p. 186-188.
(W11r, W23n)

359-W. Plastic Tools Get Steel Armor. F. C. Livingstone. *Canadian Machinery,* v. 69, Mar. 1958, p. 106-107.
Plastic tools sprayed with metal.
(W24n, L23; NM-d)

360-W. These Filler Materials Stand the Heat. A. M. Setapen. *Design Engineering,* v. 4, June 1958, p. 65-66.
(W29h, K8; SS, SGA-f)

361-W. Low Frequency Induction Furnaces. W. Von Asten. *Engineer and Foundryman,* v. 22, Feb. 1958, p. 35-37, 52.
(W18a)

362-W. Describe Brazing Filler Metals for High-Temperature Service. *Industrial Laboratories,* v. 9, June 1958, p. 74-75.
(W29h, K8; SS, SGA-f)

363-W. Lubrication in Rolling Mills. S. L. Norton. *Iron and Coal Trades Review,* v. 175, Nov. 8, 1957, p. 1097-1098.
(W23, 18-73)

364-W.* **Development of a Remotely Operated Vacuum Induction Furnace.** G. M. Gillies and B. A. J. Lister. *United Kingdom Atomic Energy Authority,* AERE C/R 2148, 1957, 18 p.
Furnace for melting and bottom-pour casting of uranium by remote operation on a scale up to 5 kg.
(W18a, 1-73, W12a; U)

365-W. (Rumanian.) **Contribution to the Establishing of a Method of Calculating the Capacity of Crushers.** I. Huber Panu and Emil Popa. *Studii si Cercetari de Metalurgie,* v. 2, no. 4, 1957, p. 499-522.
Method for computation of the capacity of sphere and rod-type crushers and of the principal dimensions which these machines must have in order to satisfy required crushing conditions. 11 ref.
(W15n, 17-51)

366-W. (Russian.) **Methods for Reducing Down Time of Sintering Equipment.** D. P. Pritykin and A. V. Drimbo. *Stal',* v. 18, Mar. 1958, p. 202-206.
Design improvement in trippers, screens, pebble mills, crushers, mixing drums, table feeders and other units of sintering equipment sharply reduced down time for repair.
(W15n, W15p, B16, 1-52, 17-51, 18-71; Fe)

367-W. (Russian.) **Prolonging the Life of Blast Furnace Charging Equipment.** M. A. Tylkin, I. F. Parfentyev and V. I. Sivak, *Stal',* v. 18, Mar. 1958, p. 207-208.
Life of charging equipment may be prolonged considerably by adopting certain constructional improvements and by careful elimination of overheating and sharp temperature fluctuations, and by the maintenance of a uniform furnace performance.
(W12b, W17g, 1-52)

368-W. (Russian.) **Increasing the Durability of Large Ingot Molds by Reinforcement.** I. E. Brainin, I. I. Bornatsky and K. S. Alferov. *Stal',* v. 18, Mar. 1958, p. 267-270.
(W19c; ST)

369-W. (Russian.) **Experience in the Design and Operation of Evaporative Cooling of Metallurgical Furnaces.** S. M. Andonyev. *Stal',* v. 18, Mar. 1958, p. 271-280.
(W10f, 17-51)

370-W. (Book—German.) **Construction and Operation of Cupolas, 2nd Ed.** 382 p. 2 v. 1953, 1956. William Knapp-Verlagg, Haale (Saale), Germany. $2.65.

Design features and optimum procedures for engineers and foundrymen. (W18d, E10a)

371-W.* (French.) **Use of Spheroidal Cast Iron in Die Casting Zinc and Aluminum Alloys.** Luciano Oltrasi. *Fonderie,* no. 145, Feb. 1958, p. 75-78.

Spheroidal cast iron parts have longer service life than those made of ordinary cast iron in following applications: crucibles for melting or holding Al or Zamak in electric furnaces; pistons in cold chamber machines for die-casting Al; goosenecks of hot chamber machines for Zamak. 3 ref.
(W19f, W18h, E13, 17-57; CI-r)

372-W.* **A New Combustion Process for Temperature Uniformity in Heat Treating Furnaces.** F. C. T. Daniels and Steve Stasko. *Iron and Steel Engineer,* v. 35, July 1958, p. 85-91.

Burners designed to use excess air give improved temperature uniformity and control. Outstanding features are circular heated air motion, positive furnace pressure, forced convection. Process is applicable to any heating or heat treating operation within range of ferrous heat treating temperatures, including mold drying. (W27g, S18s)

373-W. **Vacuum Die Casting Equipment.** Meyer R. Tenenbaum. *Die Casting Engineer,* v. 2, Mar. 1958, p. 15.

(E13, 1-73, W19n)

374-W. **Evaluation and Synthesis of Test Data for Materials Used in Boilers and Steam Pipes for High Temperature Service.** S. C. Roy. *Institution of Engineers (India), Journal,* v. 38, Apr. 1958, p. 755-767.

For a temperature range between 800 and 900° F., evaluation of working stresses should take into consideration the creep properties of a material, but should be limited to the criteria for evaluation of stresses at lower temperatures. 20 ref.
(W11g; ST, 17-57)

375-W. **The Fully Continuous Medium Strip Mill of Th. Wuppermann.** Heinrich Lampmann. *Stahl und Eisen,* v. 78, Feb. 6, 1958, p. 160-167. (Iron and Steel Institute, Translation no. 899.)

Previously abstracted from original. See item 155-W, 1958.
(W23c, F23, 1-61)

376-W. **Continuous Pusher-Type Heating Furnace With Full Automatic Control and Ceramic Skid Rails.** Fritz Fechter. *Stahl und Eisen,* v. 78, Mar. 6, 1958, p. 299-303. (Iron and Steel Institute, Translation no. 1023.)

Previously abstracted from original. See item 250-W, 1958.
(W20h, F21b)

377-W.* **Ceramic Tooling.** Herbert Schwartz. *Modern Machine Shop,* v. 31, Aug. 1958, p. 70-75.

Uses and advantages of ceramic materials in producing tooling for high temperature. (W25b; NM-f)

378-W.* (Italian.) **Manufacture of Aluminum Heat Exchangers.** *Alluminio,* v. 27, June 1958, p. 289-306.

Descriptions and photographs of numerous American and European devices and components; types of exchangers and their applications; physical requirements; fabrication techniques. Tables of mechanical and technological characteristics of numerous Al alloys, machining norms and other data. 17 ref.
(W13b, 17-57; Al-b)

379-W.* (English.) **Establishing of a Relation Between the Life of Ingot Molds and the Quality of Cast Iron for Ingot Molds.** Traian Dumitrescu. *Revue de Métallurgie (Bucarest),* v. 1, 1956, p. 55-62.

On the basis of tests conducted on 99 ingot molds of compositions which cover the range used in practice, it is found that a well-defined, nearly parabolic, relation exists between the life of the ingot molds and the combined effect of the Si, Mn and S, represented by the ratio k of Si to free Mn. The life of the mold is a minimum for k between 7-9 and increases when the ratio drops below 7 or rises above 9. To obtain optimal life the only practically realizable solution is to increase the Mn content so that k be around unity. 4 ref.
(W19c, 17-57; CI, 17-52)

380-W. **Ingot Molds of Magnesium-Treated Spheroidal-Graphite Cast Iron.** G. A. Pisarenko. *Metallurg,* Dec. 1956, p. 16-19. (Henry Brutcher, Altadena, Calif., Translation no. 4203.)

Recommended cupola melting practice for mold iron; make-up of charge. Method and set-up for Mg treatment of cupola iron; composition of iron. Technique of casting the ingot molds; how to avoid subcutaneous cavities; how to heat

treat the molds. Typical microstructure of mold iron. Service life and production costs of new molds compared with molds of ordinary gray iron. (W19c, 17-57, E25q; CI-r, *Mg*)

381-W.* (German.) **Operation of Graphite Melting Crucibles.** Alfred Naundorf. *Giessereitechnik,* v. 4, Apr. 1958, p. 86-91.

Composition and properties of crucibles, installation in furnaces; effect of fuel on crucibles; use of fluxes; treatment of crucibles after usage. (W18h, 1-52, E10p)

382-W. A Modern Forging Press and Its Control. Otto Hoffmann and Alex Krynytzky. *Iron and Steel Engineer,* v. 35, July 1958, p. 81-93.

(W22p, 1-52)

383-W. Standardized Component Parts for Heavy Duty Mill Type Cranes. M. R. Bowerman and E. R. Madison. *Iron and Steel Engineer,* v. 35, July 1958, p. 104-111.

(W12q)

384-W. Card Programming Control of Rolling Mills. Pt. 1-2. Robert W. Holman, R. G. Beadle and W. E. Miller. *Iron and Steel Engineer,* v. 35, June 1958, p. 113-119.

(W23, 18-74)

385-W. (German.) **Hardening in New Electric Furnaces.** Th. Tuerk. *Elektrowaerme,* July 1957, p. 260-268.

Furnaces with controlled atmosphere. (W27n, 1-52)

386-W. (German.) **New Hot Strip Rolling Mill of Borsig AG in Berlin-Tegel.** Walter Stenger and Olaf Dahlke. *Stahl und Eisen,* v. 78, June 12, 1958, p. 812-820.

(W23c, 18-67, 1-52)

387-W. (Italian.) **Induction Furnaces for Ferrous Alloys in Italy and Other Countries.** E. Calamari. *Fonderia Italiana,* v. 7, Apr. 1958, p. 129-133.

6 ref. (W17a; Fe)

388-W. (Italian.) **High-Frequency Welding Machines for Arc Welding.** Emilio Biffi. *Rivista Italiana della Saldatura,* v. 10, Jan-Feb. 1958, p. 3-7.

(W29a, K1, 1-52)

389-W. Temperature Uniformity in Heat Treating Furnace. F. C. T. Daniels and Steve Stasko. *Industrial Heating,* v. 25, July 1958, p. 1342-1346.

A new combustion process for maintaining temperature control and uniformity in heat treating furnaces involves a different approach to the placement of burners and to their method of firing. (W27g; X9, 1-52)

390-W. Storage, Piping and Control of Oxy-Acetylene. D. L. Caldwell. *Industry and Welding,* v. 31, Aug. 1958, p. 38-39.

(W29e, K2h)

391-W. Metallurgy in Nuclear Engineering. J. Burkett. *Metallurgia,* v. 58, July 1958, p. 32-36.

Materials of construction, metallurgy of reactor fuels, welding of reactor materials. 96 ref. (W11p, 17-57, 10-54)

392-W. Jigs and Fixtures for Heat Treatment and Other Metallurgical Operations. L. G. H. Palethorpe. *Metal Treatment and Drop Forging,* v. 25, July 1958, p. 275-282.

Handling methods in heat treatment, quenching and related operations. (W12s, W28a, 1-52)

393-W. Numerical Control—for Big or Small User. Peter Trippe. *Metalworking Production,* v. 102, July 11, 1958, p. 1209-1212.

Rapid programming, low scrap rate, high speed of tape-controlled machining equipment makes its use feasible for even small firms. (W25; 18-74)

394-W. Extrusion Handling Systems Save Money, Time. Kim Darby. *Modern Metals,* v. 14, July 1958, p. 66-67.

"Walking beam" method of moving extrusions. (W12r, 18-74; 4-58)

395-W. Determination of Minimum Consumption of Electric Power in Arc Furnaces. N. A. Markov. *Stal',* v. 17, May 1957, p. 419-422. (Iron and Steel Institute Translation no. 579.)

Previously abstracted from original. See item 6-W, 1958. (W18s, 16-61)

396-W. The New Light Section and Wire Rod Mill of the Klockner-Huttenwerk Haspe in Hagen-Haspe. Arthur Weyel and Hans Weide. *Stahl und Eisen,* v. 77, Oct. 17, 1957, p. 1464, 1476. (Iron and Steel Institute Translation no. 749.)

Previously abstracted from original. See item 43-W, 1958. (W23d, F23)

397-W. Control and Regulation of the Twin Drive of a Heavy Plate Mill. Otto Martin. *Stahl und Eisen,* v. 77, Oct. 31, 1957, p. 1607-1610. (Iron and Steel Institute Translation no. 770.)

Previously abstracted from original. See item 43-W, 1958. (W23b, W23n, 4-53; ST)

398-W. Electrical Resistance Heating for the Processing of Steel. Wil-

helm Stich. *Stahl und Eisen,* v. 77, Apr. 4, 1957, p. 394-408. (Iron and Steel Institute Translation no. 863.)

Previously abstracted from original. See item 183-W, 1957.
(W27, J-general)

399-W. (French.) **Low-Shaft Blast-Furnace.** H. Malcor. *Revue Technique Luxembourgeoise,* v. 50, Apr-June 1958, p. 65-77.

Use of ore fines; agglomeration of fine ores by vacuum extrusion; types of fuel; economic values.
(W17h, D1)

400-W. (German.) **Design of Ingot Molds for Casting Forging Ingots.** Henriette Vorlova. *Bergakademie,* v. 10, Apr. 1958, p. 245-250.

(W19c, 17-51; ST)

401-W. (German.) **Development of Gas and Electro-Heated Metal Spray Pistols.** K. Kreutzfeldt. *Industrie-Anzeiger,* v. 80, June 20, 1958, p. 714-715.

(W4g, 1-52)

402-W. (Italian.) **Low-Frequency Induction Furnaces in the Electrification of Foundries.** E. Calamari. *Industria Italiana Elettrotecnica,* v. 11, Feb. 1958, p. 43-52.

(W18a, E10)

403-W. (Russian.) **Improvement in Design of Cooling Equipment for Electric Arc Furnaces.** A. I. Sapko and V. P. Dobrov. *Metallurg,* v. 3, May 1958, p. 17-20.

(W18s, W10f)

404-W.* (Russian.) **Possibilities for Increased Output of Soaking Pits.** L. V. Ilovaiskii. *Stal',* June 1958, p. 537-541.

Increased output can be attained by more efficient organization of stripping, transportation and charging of ingots into soaking pits. This requires that the initial high temperature of ingots be conserved as much as possible up to the moment of their charging. (W20g, A5; ST)

405-W.* (Russian.) **Effect of Mold Making Process on Durability of Ingot Molds.** N. I. Pavlovtseva and L. M. Cherkasov. *Stal',* June 1958, p. 569-574.

To eliminate cracks in molds, it is essential that mold forms be carefully cleaned, particularly at the joints, that defects on internal and external surfaces as well as solid flanges be removed. Unevenness in walls of 5 to 8 mm. will speed formation of cracks. (W19c)

406-W. **The Electric Resistance Furnace.** Gerhard Simon. *AEG Progress,* no. 5, 1957, p. 225-233.

Design, applications and classification of various types of resistance furnaces. (W27j)

407-W. (German.) **Coated Electrodes for Manual Arc Welding of Iron.** K. L. Zeyen. *Draht,* v. 9, June 1958, p. 211-217.

Survey of electrode standards in Germany and other countries.
(W29h)

408-W. (German.) **Transportation in Foundries by Means of Ropes and Chains.** A. Hohmann. *Giesserei-Praxis,* no. 10, May 1958, p. 194-195.

(W12, W19)

409-W. (German.) **Developments in Molding Machines in Germany and Other Countries.** Werner Hofmann. *Giessereitechnik,* v. 4, Apr. 1958, p. 75-78, May 1958, p. 97-102.

(W19g)

410-W. (German.) **Improved Gas-Fired Drying Oven.** Fritz Bruun. *Giessereitechnik,* v. 4, Apr. 1958, p. 80-83.

(W19k)

411-W. (German.) **Pressure Die Casting Equipment.** Werner Radehaus. *Giessereitechnik,* v. 4, May 1958, p. 102-106.

(W19f, E13)

412-W. (German.) **Control Devices for Resistance Welding Machines.** Walter Masing. *Schweissen und Schneiden,* v. 10, July 1958, p. 276-281.

(W29c, K3, K9)

413-W. (Russian.) **Increasing the Weight of Bloom Ingots.** A. M. Ofengenden. *Metallurg,* v. 3, June 1958, p. 13-15.

Necessary readjustments in rolling mill to handle heavier ingots (that were enlarged from 2.8 to 3.4 tons) and resulting economies in use of ingot molds.
(W19c, W23a; ST)

414-W. (Russian.) **World's Largest Installation for Continuous Steel Casting.** V. V. Ful'makht and A. G. Chumichev. *Metallurg,* v. 3, June 1958, p. 15-17.

(W10a, D9q)

415-W.* (German.) **Hundred Years of Regenerative Firing. Growth of the Openhearth Furnace.** Franz Bartu. *Stahl und Eisen,* v. 78, May 29, 1958, p. 713-733.

Invention of the regenerative furnace system by F. Siemens 100 years ago. First industrial applications.

Production in 1863 of the first open-hearth steel by P. Martin in a Siemens-type regenerative furnace. Evolution of the openhearth furnace up to the present; importance of refractories and their development. Development of individual parts of the furnaces, especially of the regenerators. Fuels used; the tilting openhearth furnace; heat economy; theoretical fundamentals for the construction of furnaces. 82 ref. (W18r, A2)

416-W. Research on Liquid Metals as Power Transmission Fluids. R. H. Blackmer. General Electric Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131743, Feb. 1958, 100 p. $2.50.

NaK 77 was the most feasible liquid known for aircraft hydraulic system applications in the 10 to 1000° F. temperature range. (W11; Na, K, 1-70, 14-60)

417-W. New Plant at Shepcote Lane Rolling Mills. *British Steelmaker,* v. 24, June 1958, p. 182-185.

Plant for wide stainless steel strip includes Sendzimir cold mill, 35 by 72-in. 2-high reversing roughing mill, reversing hot finishing mill now converted to a Stackel mill, and 4-high reversing cold reduction mill. (W23c; ST)

418-W. Mercury Arc Converters for Large Reversing Drives. *British Steelmaker,* v. 24, June 1958, p. 186-188. (W11, W23n)

419-W. New Metal Finishing Installations at Vauxhall Motors Ltd. Pt. 3. The Morrisflex-Hammond and Acme Automatic Polishing Equipments. *Electroplating and Metal Finishing,* v. 11, June 1958, p. 201-206.

Equipment for buffing and polishing Cu-plated auto components. (W2n, L10a; *Cu,* 8-12)

420-W. A Versatile Vacuum Furnace. B. L. Molander. *Metal Treating,* v. 9, July-Aug. 1958, p. 2-3.

Problems associated with the production brazing, heat treating, annealing and stress relieving of Ti are being solved with new vacuum furnace. (W27, 1-73, J-general; Ti-b)

421-W. Titanium Rod and Sheet. *Metal Industry,* v. 92, June 13, 1958, p. 487-489.

Factory includes rod plant, containing Robertson 2-stand 3-high mill, Morgardshammer 5-stand guide mill, finishing machines and furnaces, and sheet plant, containing Brightside 3-high mill, Robertson 4-high mill, Sack 4-high, furnaces, cutting equipment, and descaling plant. (W23d, W23c; Ti, 4-55, 18-67)

422-W. Recent Heat Treatment Furnace Installations. *Metallurgia,* v. 57, June 1958, p. 283-302.

Variety of heat treating furnaces recently installed in Great Britain. (W27; 17-51, 17-52)

423-W. (French.) A New Device for Mechanical Weighting of Molds. *Journal d'Informations Techniques des Industries de la Fonderie,* v. 95, Apr. 1958, p. 5-8.

Patented turntable device installed in conveyer molding line at Ouillins removes weights from filled molds and places them slowly and in exact position required on molds approaching pouring zone. (W19g, W12s)

424-W. (French.) A Cart for the Cupola Tender. *Journal d'Informations Techniques des Industries de la Fonderie,* v. 95, Apr. 1958, p. 12-14.

Compact hand truck includes receptacles and shelves for tools and materials, small desk. (W12n)

425-W. (German.) Influence of the Design and Operation of Pusher-Type Furnaces on the Surface Finish of the Products Reheated Therein. Berthold von Sothen. *Stahl und Eisen,* v. 78, May 29, 1958, p. 733-736. (W27, 17-51, 17-52)

426-W. (German.) Design of Convertible Machine Tools. H. Puschmann. *Werkstattstechnik und Maschinenbau,* v. 48, June 1958, p. 308-309.

Standardization of parts and prefabrication of assembly units. (W25, 17-51)

427-W. (German.) Lacquer Spraying and Drying Plants. F. Fessel. *Werkstattstechnik und Maschinenbau,* v. 48, June 1958, p. 323-327. (W4, L26n)

428-W. (German.) New Pressure Sintering Plant of the Stolberger Zinc A.G.'s Lead Smelter in Binsfeldhammer. Rudolf Schmidt and Reinhard Fischer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, July 1958, p. 301-310. (W15, B16a; Pb)

429-W.* (French.) How to Build a Steel Mill. Claude Laperrousaz. *Manutention,* no. 46, Apr. 1958, p. 73-78.

Two possible plant layouts and sets of equipment for mass pro-

duction of 500-kg. ingots are analyzed in terms of efficiency, safety, investment, maintenance, space requirements and other factors. Coefficient of use of cranes becomes governing factor in selection and placement of equipment, including cranes themselves, to handle raw materials and product of 50-ton electric furnace to be tapped approximately every 200 min.
(W10a, W12q, W18s, 1-52; ST)

430-W.* (German.) **Experiences With Permanent Molds.** Hermann Wesner. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 46-67.

In the manufacture of permanent molds the preservation of the cast skin on all surfaces that will come in touch with the molten steel is important. Only core-marks are machined. The undivided half-mold with a false core is most suitable. The false core has to be fitted with the pouring basin and sprue and with efficient risers, for risers in the mold itself would not provide the sufficient pressure to avoid pipes, and pouring immediately against the mold would cause fast wear. In the experiments, the molds were blackened successfully with a mixture of soot and alcohol. All the experiments were made with electric steel. (W19g, E12; ST)

431-W.* (German.) **How to Increase the Durability of Cast Iron Permanent Molds.** Walter Feicke and Georg Arand. *Freiberger Forschungshefte,* no. B30-1, 1958, p. 135-180.

Material used is different for each type of production; cast iron for steel mill ingot molds; alloy steel and nickel alloy cast iron for centrifugal castings; gray cast iron and carbon steel for shaped castings. Thermal resistance in relation to the tensile strength, Brinell hardness and thermal conductivity; dimensional stability at various temperatures. Suggested materials are of stable ferrite or pearlite structure with the graphite particles as short as possible. 38 ref. (W19g, 17-57, P10d, Q27a, Q29b; AY, CI, CN)

432-W.* (French.) **Contribution to the Study of Rolling Mill Equipment. Pt. 2. Rolling Mills. Sect. 6, Rod and Strip Mills.** G. Grenier. *Echo des Mines et de la Metallurgie,* no. 3516, May 1958, p. 293-295.

Roll trains in U S. for making 18-8 stainless steel rod. European strip mills from about 1900 to present. (To be continued.)
(W23c, W23d, 1-52, A2)

433-W. Vacuum Melting and Heat Treating. Pt. 2. Vacuum Heat Treating. Roger R. Giler. *Industrial Heating,* v. 25, Aug. 1958, p. 1516-1520, 1522, 1524, 1526, 1670.

Furnace design. (W27n, J2k, 1-73)

434-W. How to Select Copper-Base Rods. *Metalworking,* v. 14, July 1958, p. 16-19.

Data on composition, hardness and welding utilization of Cu-base electrodes and filler rods.
(W29h, 17-57; Cu)

435-W. Study of New Die Steels for Stamping Heat Resistant Alloys. A. P. Gulyaev, S. L. Rustem and G. N. Orekhov. *Metallovedenie i Obrabotka Metallov,* v. 4, July 1958, p. 2-10. (Henry Brutcher, Altadena, Calif., Translation no. 4274.)

Review of developments in U.S.A., Britain, France and Switzerland. 7 ref. (W24n, 17-57; ST, SGA-h)

436-W. (Russian.) Highly Stable Electrodes for Electro-Impulse Treatment of Metals. A. L. Livshits, G. K. Bannikov and A. M. Sigarev. *Stanki i Instrument,* v. 29, May 1958, p. 23-25.

Possibility of replaceing Cu with carbon electrodes, which reduces cost by 50%. Stability of carbon electrodes is determined by porosity of metal welded and its crystal structure. Durability of electrodes increases with decrease in grain size. (W29h, 17-57; Cu, C)

437-W.* (German.) **Aluminum Lengthwise-Finned Heat Exchangers. Pt. 1.** F. Lohmann. *Aluminium,* v. 34, July 1958, p. 410-416.

Advantages of Al for use in heat exchangers; temperature and pressure limitations; designing to utilize high thermal conductivity of Al, possibilities for the use of extruded sections; theoretical considerations in heat transfer.
(W13b, 17-57, 17-51; Al, 4-58)

438-W. The Largest Pressing Facility Yet. *Canadian Metalworking,* v. 21, Aug. 1958, p. 52, 54, 56.

Huge steel presses developed for vast reactor vessels used for nuclear power purposes. (W24g, W11p)

439-W. (French.) **Copper Alloys for Welding Electrodes.** C. Lachaud. *Cuivre Laitons Alliages,* no. 43, May-June 1958, p. 11-18.
(W29, 17-57; Cu-b)

440-W. (German.) **Composition and Behavior of Special Steel Alloy Dies in Pressure Die Casting.** K. J. Bengtsson. *Giesserei-Praxis*, v. 14, July 25, 1958, p. 278-279.
(W19n, 17-57, Q-general, R6m; AY)

441-W. (Russian.) **Use of Martensite for Repairing Openhearth Furnace Bottoms.** F. Z. Dolkart, P. P. Semenenko and S. G. Slesarev. *Stal'*, v. 18, July 1958, p. 604-606.
(W18r; RM-h)

442-W.* (German.) **Trends in the Automation of Iron Mills.** Hans Vogel. *Stahl und Eisen*, v. 78, July 24, 1958, p. 1033-1038.

Processes, measuring and counting devices for automation of rolling mills. Individual drive by d.c. motors allows a better adjustment of the rpm. using automatic control devices and is preferred. In large automatic systems, space-saving, wear resistant and maintenance-free low-tension equipment is replacing heavy equipment. Description of automated continuous hot rolling trains, reversing trains and cold rolling mills. (W23, 18-74)

443-W.* (German.) **Firing of Small Forge Furnaces With Heavy Fuel Oil.** Hugo Remus. *Stahl und Eisen*, v. 78, July 24, 1958, p. 1038-1041.

Transport and piping of heavy oil. Design of experimental furnaces suitable for this fuel; main features are: high air-pressure burner; deviated flame to avoid wear of lining; pneumatically opened door, protected by a water spray. The oil consumption was found to be rather high, yet may be reduced by increasing the hearth-area efficiency.
(W20h, 1-52; RM-k30)

444-W. A. C. Electric Power for Melting Metals. Pt. 1. W. L. Harrison. *Electrical Energy*, v. 2, July 1958, p. 250-256.

Characteristics of direct arc, indirect arc, coreless induction and other type furnaces, voltage flicker, power factor, electrical efficiency. (To be continued.)
(W18a, W18s, 16-61, 1-52)

445-W. Painting and Anodizing Rack Design. Henry Kraus. *Metal Finishing*, v. 56, Aug. 1958, p. 62-69.

(W3g, 17-51, L26, L19)

446-W. Mechanical Presses—Their Selection, Design and Function. Chapter 9. Electrical Press Controls. Pt. 1. Protection of Operator. *Metal Forming and Fabricating*, v. 20, Aug. 1958, p. 21-23.

(W24g, 1-52, A7)

447-W. Performance of Forsterite Refractories in Bottoms of Forge Reheating Furnaces. V. I. Sinyanskii. *Ogneupory*, v. 22, no. 12, 1957, p. 568-571. (Henry Brutcher, Altadena, Calif., Translation no. 4266.)

(W27, 1-52; RM-h)

448-W. (German.) **Determination of Tolerances in the Design of Punches and Dies.** L. Segalle. *Fertigungstechnik*, v. 8, May 1958, p. 209-217.

In the design of tools, special construction features, structural properties and thickness of the sheet metal to be used in production. The size and shape of parts to be manufactured and the clearance between punch and die should be taken in consideration. (W24n, W24p, 17-51)

449-W. (German.) **A New Type Grinding Wheel.** H. Kohlhase. *Fertigungstechnik*, v. 8, July 1958, p. 315-316.

A special grinding wheel fitted with bristles and abrasive cloth machine-grinds inaccessible lacquered surfaces. (W25c)

450-W.* Calculation of Cooling Characteristics of Barstock on Cooling Beds and the Suitability of Certain Cooling Bed Designs for Material of Different Compositions and Profiles. Paul Grüner. *Draht (English Edition)*, no. 35, June 1958, p. 19-26.

Principal purposes and functions of cooling beds. Drives and designs of various cooling bed units, including inlet roller conveyor, transverse feeder, rod aligner, transfer unit, mechanical rake, Morgan, Edwards, roller-type and rotating type cooling beds. (To be concluded.)
(W23p, F27, 1-52; ST)

451-W.* (Spanish.) **Deep Penetration Electrodes.** Celso Penche. *Ciencia y Tecnica de la Soldadura*, v. 8, May-June, 1958, 14 p.

History; types, techniques of use; technological and economic advantages; structural, metallurgical behavior and mechanical properties of welds obtained on various steels; applications. (W29h, K1)

452-W.* Light Section Rolling Mills. Stanislav Makrlik. *Czechoslovak Heavy Industry*, June 1958, p. 25-31.

Three typical examples of rolling mill designs. Metallurgical plants

supplying the technical particulars and requirements, so the supplier can design a mill based on technical and economic analysis. (W23, 17-51)

453-W.* Mercury-Arc Converters for Induction Heating. T. A. Cosh. *Foundry Trade Journal,* v. 105, Sept. 4, 1958, p. 291-294.

Application of grid control to mercury-arc rectifiers as sources for high-frequency electric supplies in relation to their application to melting furnaces. (W18a, E-general)

454-W.* (German.) Test with Zirconium Silicate Linings in Arc Furnace Covers. Alfred Theis. *Stahl und Eisen,* v. 78, June 26, 1958, p. 891-892.

A lining based on zirconium-cristobalite proved successful for covers of arc furnaces subjected to severe wear. A prerequisite is adequate cooling of the cover to prevent distortion. The additional life of lining (up to 126 heats) and savings in brickwork offset in many cases the higher cost of the lining material. Small heat expansion and high resistance to fire pressure are the main characteristics in comparison to conventional silicate linings. (W18s; RM-h)

455-W.* (Polish.) Flame, Gas-Fired Furnace With Heat Recuperation for Pig Iron Melting. Gabriel Kniaginin and Roman Andrzejewski. *Hutnik,* v. 25, May 1958, p. 165-171.

Furnace of 25 tons capacity. Process of pig iron melting. Heat balance of the furnace. Suggested improvements. 8 ref. (W19a; CI-a)

456-W.* (Russian.) Hard Metal Reinforced Punching Dies. S. S.Chetverikov and N. K. Foteev. *Vestnik Mashinostroeniya,* v. 38, Aug. 1958, p. 38-40.

Experiments for determining most effective metallo-ceramic alloys for reinforcing dies utilized transformer sheet steel, 0.5 mm. thick, of composition 0.1% C, 4.2% Si, 0.1-0.2% Mn, 0.025% P and 0.035% S. Alloys of medium grain size are most effective. Reinforced punching dies of above steel are ten times more durable than those using tool steel, and operate with much greater precision. (W24n, 17-57; ST, Si, 4-53, 6-70)

457-W. Applying Carbides to Drawing Steel Casings. *Carbide Engineering,* v. 10, Sept. 1958, p. 22.

Use of carbide dies for drawing 7-in. oil well casings at Pittsburgh Steel Co.'s Allenport Works saves money over steel dies. (W24n; 6-69)

458-W. Rolling Mills. Vaclav Matousek. *Czechoslovak Heavy Industry,* June 1958, p. 20-25.

Czech rolling mill equipment. (W23c, 18-67; ST)

459-W. Machinery Equipment for Rolling Mills of Non-Ferrous and Light Metal Sheets, Plates and Strips. Vladimir Sipek. *Czechoslovak Heavy Industry,* June 1958, p. 32-46.

(W23c, F23q, 1-52, 18-67; Al, Zn, Cu)

460-W. Recent Development in Industrial Furnaces. *Draht (English Edition),* no. 35, June 1958, p. 40-42. (W27)

461-W. Automatic Lathes for the Production of Nuts and Screws. Heinz Petrick. *Draht (English Edition),* no. 35, June 1958, p. 42-46. (W25n, T7f)

462-W. Future of Low Shaft Furnaces in India. M. N. Dastur and R. D. Lalkaka. *Indian Institute of Metals, Transactions,* v. 9, 1955-1956, p. 59-82.

Operating features of two representative types of low-shaft furnace processes for the production of iron from inferior raw materials—the Calbe type and DHN type. 6 ref. (W17h, 1-52)

463-W. The Rolling Mill Plant of the I.C.C. Ltd at the Moubhandar Works, Ghatsila. D. Singh. *Indian Institute of Metals, Transactions, v.* 9, 1955-1956, p. 263-274.

Equipment and layout. (W23, 18-67)

464-W. How to Design Conveyor Rolls for Drive or Drag. Laurence H. Austin. *Product Engineering,* v. 29, Sept. 15, 1958, p. 78-79.

Pinch and bridle rolls, grouping of rolls for desired effect; power calculations. (W23c, 17-51, F23)

465-W. The Significance of Velindre Works. A Technical Survey of the Velindre Works of the Steel Co. of Wales Ltd. H. Leighton Davies. *Sheet Metal Industries,* Technical Survey no. 6, 1958, 96 p.

Installation of new mill for rolling, tinplating of strip steel. A 5-stand mill has capacity of over 400 tons per shift. (W23c, L16; ST, *Sn*)

466-W. Steel Plant Installs Cupolas. *Steel,* v. 143, Sept. 29, 1958, p. 94-97.

Cupolas with high top-pressure, hot blast, split wind blowing, furnish hot metal for oxygen converters in new plant. (W18; ST)

467-W. Magnetic Test Accurately Compares Heat Extraction Properties of Quenching Media. Edward A. Bender and Harry J. Gilliland. *Tooling and Production,* v. 24, Sept. 1958, p. 55-58.

Test measures time required for a medium to cool a metal to its Curie point, where it then regains the magnetic properties which it lost through superheating. The equipment also can be used to investigate the heat extraction properties of other substances, such as cutting fluids. (W28p, 1-54; NM-h)

468-W. (Czech.) Modern Regulation Technique of Rolling Mill Drives. Jan Soukenik. *Hutnické Listy,* v. 13, no. 7, 1958, p. 620-625.

Properties of principal types of drive motors and corresponding regulating equipment. (W23n)

469-W.* (German.) Mechanization of a Gray-Iron Foundry. Hans Krause. *Giessereitechnik,* v. 4, July 1958, p. 145-153.

Different sands are transported into large containers that discharge in the right proportion to a sand mixer. Old sand, coal dust and water are added and the mixture is fed to a sandslinger.
(W19h, 18-74; CI-n)

470-W. (Russian.) Centralized Production of Tools for Tube Rolling Mills. Yu. I. Nikolaevskii and M. Ya. Krichevskii. *Stal',* v. 18, July 1958, p. 633-635.

Expanding needs of Soviet metallurgical industry calls for plants which specialize in production as well as repair, heat treatment and testing of tube mill tools and equipment. (W23h, F26s; ST)

471-W. (Russian.) Casting of Ingot Molds of Nodular Iron. G. A. Pisarenko, S. G. Guterman and Ya. I. Aizikovich. *Stal',* v. 18, July 1958, p. 668-672.

The stability of ingot molds cast in permanent molds is considerably lower than those made in sand molds. The stability of nodular iron ingot molds, modified with 75% ferro-silicon during pouring into chill molds, is generally higher than that of cast iron molded in semipermanent sand molds.
(W19c, 17-57, E23; CI-r)

472-W. (Russian.) Development of Forge Extrusion Plant. V. A. Massen. *Vestnik Mashinostroeniya,* v. 38, Aug. 1958, p. 32-38.

(W22, F24, 1-52)

473-W.* The Philosophy of Soaking Pits. W. Trinks. *Industrial Heating,* v. 25, Sept. 1958, p. 1732, 1734.

History and development of soaking pits and pit furnaces. Relationships between track-time and heating time, and total hearth area to monthly throughput. (W20g)

474-W.* Cast and Rammed Sections in Electric-Arc Furnace Roofs. J. D. McCullough. *Industrial Heating,* v. 25, Sept. 1958, p. 1825-1826, 1828, 1830, 1832, 1834, 1836, 1840, 1845.

Study of roof life for arc furnaces employing monolithic constructions is presented by obtaining furnace roof life at different plants producing different types of steel, and with different operating practice. (To be continued.)
(W18s; RM-h)

475-W.* The Craft of Spray Painting. Leonard Gaiger. *Product Finishing,* v. 11, Sept. 1958, p. 74-79.

Description of spray gun, technique and maintenance.
(W4g, L26n)

476-W.* The Electronically Controlled Semi-Automatic Spray System. John Webb. *Product Finishing,* v. 11, Sept. 1958, p. 81-85.

Semi-automatic paint spray methods, horizontal traverser, semi-automatic single turntable, electronically controlled spray auto, accessories for batch finishing and spindle conveyor with spray equipment.
(W3d, W4g, L26n; 18-74)

477-W.* (Czech.) Materials for the Jaws of Flash-Butt Welding Machines. René Rohan. *Zvaranie,* v. 7, Aug. 1958, p. 227-234.

Cast jaws of 85-87% Cu, 13-15% Sn, 1% max. Pb, 0.2% max. Fe, 0.2% max. Mn, 0.5% max. Zn are subject to rather fast wear in automobile wheel production. New jaw materials were tested and best results were obtained with "Cu-Ni2-Si (= CSN 423054)" when hardened at 750-780° C. for 2 hr. in oil and tempered at 500° C. for 4 hr. in air. Its composition: 2.28% Ni, 0.52% Si, 0.07% Fe, 0.01% Al, 96.7% Cu. (W29k, 17-57, W3r; Cu-b)

478-W.* Filler Metal for Joining. Orville T. Barnett. *Welding Engineer,* v. 43, Oct. 1958, p. 48-50.

Tungsten electrodes (pure W, thoriated W and Zr-W) used in Tig welding, including chemical analysis and welding properties. Comparison of commercial Tig welding electrodes. (W29h, 17-57; W, SGA-f)

479-W. Automatic Batch Furnace Cuts Costs. *Canadian Metalworking,* v. 21, Sept. 1958, p. 20, 22, 24. (W27g; 1-62, 18-74)

480-W. 150-Ton Electric Arc Furnace. Gaston Stassin. *Iron and Coal Trades Review,* v. 177, Aug. 15, 1958, p. 379-381.

Operating practice at S.A. Fabrique de Fer, Charleroi. (W18s, D5, ST)

481-W. Mill Gearing as Viewed by a Lubrication Engineer. A. E. Cichelli. *Iron and Steel Engineer,* v. 35, Sept. 1958, p. 91-102.

Problems relating to mill drives, types of rolling mills, lubrication, gear design theory. 6 ref. (W23, T7a; NM-h)

482-W. Bend and Weld Cabinets Automatically. R. F. Hermann. *Metalworking Production,* v. 102, Sept. 19, 1958, p. 1650-1653.

Introduction of a four-station integrated line of automatic sheet-feeding equipment, piercing, notching and embossing presses, tangent and flange benders, from which the formed cabinets are passed to a similarly automated welding line. (W12, W29, G3p, G6, K3p, 18-74)

483-W. Facing Girders Is Outsize Milling Job. *Metalworking Production,* v. 102, Sept. 19, 1958, p. 1654-1655.

Ends of large weld-fabricated structural girders, regardless of size, can be machined by new rigid milling machine. (W25r; G17b)

484-W. A Survey of General and Specialized Machine Tools for Press-Tool Production. J. A. Waller. *Sheet Metal Industries,* v. 35, Sept. 1958, p. 699-704. (W25)

485-W. Tool Vibration Is Cut 75%. *Steel,* v. 143, Oct. 6, 1958, p. 78.

Shanks for holding carbide cutting tools made from powdered metals have lower cost, increase tool life, produce improved surface finish. (W25d, 17-57; 6-72)

486-W. (German.) **Two Kinds of Gas Turbines Used in Belgian Steel Mills.** André Jaumotte. *Stahl und Eisen,* v. 78, May 15, 1958, p. 658-663.

Two kinds of gas turbines operating on blast furnace gas; characteristics and efficiency as well as maintenance probems. Lower dust contents in gas recommended for increased efficiency. (W11n, W17g, 17-52, RM-m39)

487-W. (German.) **Novel Oil-Firing Plant for Openhearth Furnaces.** Wolfgang Schleicher and Kurt Boleg. *Stahl und Eisen,* v. 78, Aug. 7, 1958, p. 1108-1109.

By the use of compressed waste gas, the fuel oil is conveyed as well as preheated and atomized. (W18r, W16; RM-k)

488-W. (Russian.) **Modernizing Resistance Melting Furnaces.** V. E. Antonov and D. Z. Steriin. *Liteinoe Proizvodstvo,* July 1958, p. 11-13.

Furnace for melting aluminum alloys in piston plant has capacity of 416 kvt., and 5 different heat zones. It turns out 700 kg. per hr. Operating temperature is 850°. (W18, 1-52; Al-b)

489-W. (Russian.) **Ventilation of Blast Furnace Hot Blast Stove Buildings.** P. V. Sidyakov, M. Ya. Zarzhevskii and G. F. Ermolaeva. *Stal',* v. 18, Aug. 1958, p. 691-693.

For effective ventilation of hot blast stove buildings and their working platforms it is recommended that use be made of the air vents installed between the hot blast stoves, which should be equipped with windscreens. The temperature drop between the outgoing air and the outdoor temperature should be maintained at 10° C. (W10d, W17g; ST)

490-W. (Russian.) **Instrument for Continuous Control of Metal Pressure on Rolls.** I. M. Meerovich. *Stal',* v. 18, Aug. 1958, p. 718-721.

Makes it possible to determine the optimum metal reduction conditions and to increase output of rolling mill without damaging any of its parts. (W23, X12)

491-W. (Russian.) **Modernization of Recuperative Soaking Pits With a Central Burner.** V. G. Kaplan, S. D. Gekhtman and L. G. Aksel'rud. *Stal',* v. 18, Aug. 1958, p. 747-751.

By increasing the surface heating and setting up a method for heating gas with a centralized burner considerable fuel economy has resulted in use of blast furnace gases

as main source of fuel.
(W20g, RM-m39)

492-W. (Russian.) **Automation of Water Supply at Iron and Steel Mills.** M. P. Suslov. *Stal'*, v. 18, Aug. 1958, p. 759-763.
(W10h, 18-74; ST)

493-W. (Russian.) **Performance of Coupling Sleeves of Nodular Cast Iron in Rolling Mills.** E. K. Turchenkova, A. I. Sikorskii and R. M. Egnus. *Stal'*, v. 18, Aug. 1958, p. 763-766.
(W23p, T7, 17-57; CI-r)

494-W. (Book.) **Gas Turbine Materials.** G. Lucas and J. F. Pollock. 163 p. 1957. Temple Press Ltd., Bowling Green Lane, London, England. 25 sh.

Historical development of high-temperature alloys. Creep and fatigue properties and corrosion resistance necessary to withstand high-temperature stress and oxidative conditions in gas turbine engines. Selection of engine material and applications of specific alloy type in compressor, combustion chamber, turbine disk, rotor assembly, turbine blading and heat exchangers. High-temperature properties and composition of commercial high-temperature alloys. Manufacture of turbine components.
(W11m, 17-57, Q-general; SGA-h)

495-W.* (French.) **Contribution to the Study of Rolling Mill Equipment. Pt. 2. Rolling Trains. Sec. 7. Sheet and Plate Mills.** G. Grenier. *Mines et Metallurgie*, June 1958, p. 365-367.

Plate and sheet products classified in four groups, according to thickness; types of rolling trains used in each case; sequence of concomitant operations (chipping, reheating, straightening, shearing, heat treatment, etc.) (W23, 1-52)

496-W.* (French.) **Study of Thomas Converter Bottoms.** Paper presented at Apr. 25, 1958, meeting of Association of Engineering Graduates, University of Liege. W. Kohler, Th. Hartman and G. Tromel. *Revue Universelle des Mines*, v. 14, Aug. 1958, p. 259-260.

Techniques of vibrating in mold and effects of vibration on distribution of material; study of fired and unfired bottoms. Effect of composition of iron processed in converter, of condition of joint between bottom and lining and other factors on bottom life. Heating and cooling of bottoms during converter operation. (W18k; RM-h)

497-W.* (French.) **Vibration of Converter Bottoms by Means of a Vibrator plate in French Steel Mills.** Paper presented at Apr. 25, 1958, meeting of Association of Engineering Graduates, University of Liege. J. de Hedonville. *Revue Universelle des Mines*, v. 14, Aug. 1958, p. 260.

Vibrator plate consists of table resting on supports under which vibrators are attached. Sole-plate and form are placed on top of table without any type of fastening. A grid to hold pipes in position is placed on top of form. Principal advantage of vibrator tables is great simplicity of installation and use. They permit manufacture of bottoms of different diameters and hole arrangement. Can also be used for making bottoms with Mg pipes. Life of bottoms vibrated by this technique is at least equal to that of rammed bottoms. (W18k; RM-h)

498-W.* (French.) **New Methods of Firing Bottom Joints in Thomas Converters.** Paper presented at Apr. 25, 1958, meeting of Association of Engineering Graduates, University of Liege. Legrandjacques, De Rousiers and Delong. *Revue Universelle des Mines*, v. 14, Aug. 1958, p. 260.

Use of oil burners; burners fed by coke plant gas; burners fed by blast furnace gas; electrical heating.
(W18p; RM-m)

499-W.* (French.) **New Method of Vibrating Converter Bottoms.** E. Glaesner. *Revue Universelle des Mines*, v. 14, Aug. 1958, p. 261-269.

Technique of top vibration by means of a plate into which are fitted rods covering pipes. Plate transmits vibrations to rods only, and these in turn to surrounding mass. Transference of vibration is highly efficient and uniform and maximum settling of dolomite mixture is achieved. This technique (which replaced system of lateral vibration), plus increase in height of bottom and use of Cu instead of steel pipes, increased bottom life by about 50%. In addition, use of a powerful burner fed by blast furnace gas for firing linings made it possible to pour instead of ram joints of first bottoms; life of latter has increased to point where it exceeds that of subsequent bottoms.
(W18p; RM-h)

500-W.* (French.) **Unfired Converter Bottoms at the Societe Cockerill-Ougree's Thomas Steel Works in Seraing.** R. Schuermans and J. Van

Neste. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 270-279.

Bottoms are placed in converter without prior firing in dolomite shop, and are then fired simultaneously with joint. Increase in average life of bottoms is attributed to higher residual carbon content and lower porosity than in fired bottoms. Effect of duration of aging of unfired bottoms before placement in furnace. Preparation of bottom mold, processing of dolomite mixture, manufacture of bottoms; specifications of bottoms, sole-plates, operating conditions, dolomite consumption. (W18p; RM-h)

501-W.* (French.) **Manufacture of Dolomite Bottoms at Marchienne Works of Forges de la Providence.** M. Ledune. *Revue Universelle des Mines,* v. 14, Aug. 1958, p. 280-283.

Description of new dolomite shop, where particle size is closely controlled. Principal innovations are heating of 2-15 mm. diameter particles by infrared radiation in a rotary furnace; use of Eirich mixer equipped with 85-lb. wheel and agitators. Heating method avoids hydration, long-wave radiation permits deep heating of particles despite their high refractoriness. Best results have been obtained with bottom mixture composed of 62% particles of 2 to 15 mm. diameter and 38% filler 0-0.35 mm., with amount of tar added representing about 9% of total mass. Bottoms are poured, then vibrated laterally. Vibration permits use of drier mixtures (9% tar instead of 12%). Bottoms are not tubed. New methods have increased lining and bottom life about 50%. (W18p; RM-h)

502-W.* (Italian.) **New Venezuelan Steel Mill.** Massimo Gonni. *Metallurgia Italiana,* v. 50, June 1958, p. 215-245.

Initial capacity of integrated mill on Orinoco River, is 700,000 tons per yr., to be increased to 1,500,000 tons per yr. in future. Martin furnaces will be used. Details of installations, local supply of raw materials, production program. Blooming mill, motors and electrical equipment for rolling mills, Martin furnaces and pit furnaces. First seamless tube was rolled in April 1958. Construction scheduled for completion in June 1960.

(W10, W17, W23, 1-52; ST)

503-W.* (German.) **Plant Tests of Mill Casings.** Urmas Runolinna. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 11, Sept. 1958, p. 432-437.

Tests of ball and rod mill casings conducted at the Otanmaki plant which separates ilmenite from Finland's titaniferous magnetite. Advantages of using steel bars for casings instead of steel plates. Weight of ball mill casing was reduced by inserting 20-mm. wide wood beams between 80-mm. wide Cr-Mn steel bars. Further weight reduction and better wear results were obtained by replacing Cr-Mn steel bars with 30-mm. wide special Cr-Ni cast iron. (W15n, 17-57; CI, ST, Cr, Ni, Mn, 4-55)

504-W.* **Power Quills Speed Output at Lower Cost.** Ben C. Brosheer. *Metalworking Production,* v. 102, Oct. 10, 1958, p. 1781-1783.

For detailed precision drilling and reaming, precision milling, grinding and polishing with coated abrasive tools, with bonded grinding wheels or with either or tungsten carbide routing cutters, or with machine-ground burrs. (W25, 1-52)

505-W.* **Bar Mill of Tomorrow.** *Steel Equipment and Maintenance News,* v. 11, Sept. 1958, p. 6-7.

Automatic operations at new bar mill consist of uniformly heating 3 and 4-in. square steel billets and then passing them through a series of alternate vertical and horizontal stands. After the bars pass through 16-mill stand, they are run off onto one of two cooling beds where they are gradually cooled before being sheared into specified lengths for shipment. Bar mill furnace data given. (W23d)

506-W. Cupola Grit and Dust Arresters. G. E. Lunt. *British Cast Iron Research Association, Journal,* v. 7, Aug. 1958, p. 317-322.

Representative types of cupola grit and spark arresters, both wet and dry, available to the iron-founding industry. (W13c, E10a)

507-W. High Purity Oxygen for Steel Making. J. T. Hugill. *Canadian Journal of Chemical Engineering,* v. 36, Aug. 1958, p. 169-174.

One hundred ton per day oxygen units built for Dominion Foundries and Steel Co., Hamilton. 7 ref. (W10; ST, O)

508-W. Lighting for Metal Plating and Finishing. W. Robinson. *Electroplating and Metal Finishing,* v. 11, Sept. 1958, p. 311-315.

Light requirement for factory, plating shop, paint spraying; inspection; cost and maintenance. (W10, L-general)

509-W. Control of Electric Arc Furnace Electrodes. William Valachovic. *Industrial Heating,* v. 25, Sept. 1958, p. 1713-1714, 1716, 1893-1894, 1896, 1898, 1900.

Electrode regulating system and electrode driving motor as factors in arc furnace performance. (W18s)

510-W. Automatic Load Control in Electric Melting Furnaces Decreases Power Costs. *Industrial Heating,* v. 25, Sept. 1958, p. 1728, 1744.

(W11s, W18s, 18-74)

511-W. Bloom Reheat Furnace of Continuous Type Minimizes Hot Steel Handling. *Industrial Heating,* v. 25, Sept. 1958, p. 1736, 1744.

Consisting of nine barrel-type units, the furnace forms an integral portion of the conveyer system between blooming mill and rail mill, eliminating two handlings of hot steel by mechanical manipulator. (W20h, 4-52)

512-W. Continuous Furnace of Unique Design Heats Copper Billets for Piercing. W. A. Darrah. *Industrial Heating,* v. 25, Sept. 1958, p. 1778-1780, 1784.

Continuous feeding furnace with new heating chamber design and arrangement for firing to achieve rapid heating and uniform billet temperature. Eliminates handling and formation of scale during transfer period. (W20h, 1-61; Cu, 4-52)

513-W. Modern High-Speed Continuous Annealing Line for Tin Plate Scheduled at J & L's Aliquippa Works. *Industrial Heating,* v. 25, Sept. 1958, p. 1782, 1784.

(W27, J23, 1-61; ST, *Sn,* 8-65)

514-W. Four Slides Ease Complex Forming. *Steel,* v. 143, Oct. 13, 1958, p. 120-121.

Vertical version of four-slide forming machine simplifies setup and operation. (W24)

515-W. On the Deterioration of Quenching Oils. Masayoshi Tagaya and Imao Tamura. *Osaka University, Technology Reports,* v. 7, Oct. 1957, p. 403-424.

12 ref. (W28p)

516-W.* Forging Huge Crankshafts. Charles H. Wick. *Machinery,* v. 65, Oct. 1958, p. 113-116.

Giant crankshafts and other massive forgings are produced from SAE 5046 steel by 50,000-lb. steam drop hammer. Installation has three hydraulic presses for sizing, bending and trimming. (W22n, 1-52; AY)

517-W.* (German.) CTIF Recuperator for the Hot Blast Cupola. Georges Ulmer. *Giesserei,* v. 45, Sept. 11, 1958, p. 531-541.

New type recuperator forms a part of the furnace itself added to its top and shaped like a double-wall chimney. The blast air is heated between the ribbed inner wall and the outer wall. Combustion of gases inside the recuperator is adjusted by a burner on the bottom and a chimney damper on the top. In this way, and by controlling the quantity of air to be preheated, efficient operation of furnace and recuperator is provided. (W18d)

518-W.* (German.) New Vibratory Process of Ramming Converter Bottoms. Ernest Glaesener. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1169-1175.

Converter bottoms of increased lifetime can be produced by a new vibrating method whereby the dolomite-tar mixture is bound uniformly by vibrating rods within the blow holes. Additional heating of the preheated mixture, before final vibrating. Bottoms produced by this method proved to be more durable than those bound by other ramming or vibrating processes. (W18p; RM-h)

519-W.* (German.) Deposits in Checker Chambers of Openhearth Furnaces Caused by Smelting Large Quantities of Scrap. Otto Darmann and Gustav Mahn. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1176-1180.

When large quantities of galvanized iron scrap are smelted, slag deposits form in the checker chambers which affect performance and lifetime of the furnace. The slag contains up to 50% ZnO and can be reduced with CO, top gas, city gas and producer gas, which makes it possible to increase the economy of a furnace if top gas is applied regularly. (W18r, D11q; RM-p, RM-q)

520-W.* (German.) Unbaked Converter Bottoms in the Basic Steel Plant of the S. A. Cockerill-Ougree. Roger Schuermans and Jaques Van Neste. *Stahl und Eisen,* v. 78, Sept. 18, 1958, p. 1308-1313.

Plant experiments with converter bottoms from a dolomite-tar mixture. A 2% manganite (MnO_2) addition exerts a polymerizing influence on the formation of coked residues. The bottoms were vibrated, aged over several weeks, built into the converter and only then baked with a fuel oil flame. A durability from 80 to 100 melts was reached. (W18p; RM-h)

521-W. Modern Wire Rolling Mills. O. Wilmes. *Draht (English Edition)*, no. 36, Aug. 1958, p. 15-18.

(W23, 4-61)

522-W. Adapting a Core Oven to Aluminum Heat Treating. Carl Mayer. *Foundry*, v. 86, Oct. 1958, p. 125.

Economies realized by a combination core baking and Al aging oven. (W19k, W27, J27a; Al-b)

523-W. Merchant and Wire Rod Mill. Leo Walter. *Iron and Steel*, v. 31, Oct. 1958, p. 485-490.

Fully continuous plant at Klöckner-Huttenwerke Haspe A. G. (W23d, 1-52; 4-61)

524-W. Automatic Fuel Control. *Iron and Steel*, v. 31, Oct. 1958, p. 507-508.

Design and construction of a new bloom reheating furnace for the Ormseby rolling mill at the Cargo Fleet iron-works of the South Durham Steel and Iron Co., Ltd. (W20h)

525-W. Contribution to the Study of Thin-Walled and Thick-Walled Blast Furnaces. J. Libricky. Paper from "Advances in Steel Technology in 1956", United Nations, 1958, p. 49-56.

Czech progress. (W17g, 17-51)

526-W. Areas of Application and Operating Results of the Short Rotary Furnace. W. Schwartz. *Metall*, v. 10, no. 3-4, 1956, p. 113-116. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. 58-1485.)

(W18b)

527-W. Determination of the Main Measurements of Siemens Martin Furnaces. S. Cernoch. *Neue Hutte*, no. 3, Jan. 1956, p. 150-156. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

(W18r)

528-W. Difficulties in Controlling Furnace Pressure. R. Jeschar. *Stahl und Eisen*, v. 20, Oct. 4, 1956, p. 1284-1289. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 241-F, 1956. (W20h, S18r)

529-W. Geometry of the Lower Part of an Ingot. L. V. Andreyuk. *Stal'*, v. 17, Jan. 1957, p. 35-38. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 473-W, 1957. (W19c, 1-52; ST)

530-W. New Cast Irons for Rolls. H. Goebel. *Stahl und Eisen*, v. 77, Feb. 7, 1957, p. 143-157. (British Cast Iron Research Assoc., Alvechurch, Birmingham, Translation no. 826.)

Previously abstracted from original. See item 127-W, 1957. (W23k; CI, 17-57)

531-W. (French.) **International Research on Thomas Converter Bottoms.** Papers presented at Apr. 25, 1958, Meeting of Association of Engineering Graduates of University of Liege. *Revue Universelle des Mines*, v. 14, Aug. 1958, p. 259-283.

Manufacture of bottoms; vibrating and firing practices; unfired bottoms; bottom life. Papers abstracted separately. (W18p; RM-h)

532-W. (Italian.) **Melting Furnaces for Zinc Alloys.** Turno di Michelis. *Fonderia*, v. 7, Aug. 1958, p. 349-355.

(W18, E10; Zn-f)

533-W.* Railroad Car Rebuilt and Repaired at Kaiser's Fontana Works. A. B. Stoker. *Iron and Steel Engineer*, v. 35, Aug. 1958, p. 132-137.

Steel plant shop designed and rebuilt railroad cars more durable and better adapted to their needs than could be purchased. Main cause of damage occurred during loading and unloading of materials by magnet and damage was increased by accumulation of nonmagnetic materials in bottom of cars. Gondola, flat, and dump car construction. (W12p, W12s, 18-72)

534-W. (Russian.) **Use of Heat Resistant Stainless Steels in Power Plants Operating Up to 600° Steam Temperature.** E. S. Ginzburg. *Metallovedenie i Obrabotka Metallov*, June 1958, p. 47-52. (Henry Brutcher, Altadena, Calif., Translation no. 4254.)

Although stainless steel with 12% Cr meets general requirements for power plant service, it is limited in use to 420-480°. Results of extensive tests indicate that alloys EI747 and EI748 are suitable for turbine blades operating between 565 and 600°. 7 ref.
(W11g, 17-57; SS, SGA-h)

535-W.* The Steam Jet Ejector: A Versatile Pump for High Vacuum. V. V. Fondrk. Paper from "1957 Fourth National Symposium on Vacuum Technology Transactions", Pergamon Press, N. Y., 1958, p. 88-94.

Performance characteristics, installation, operating and maintenance costs, typical installation on consumable electrode vacuum melting furnace. Use of ejectors on stream degassing units presently operating in various steel mills and foundries in this country.
(W13d, W18s, 1-73)

536-W.* (German.) **Modern Machines in the Light Metal Industry.** *Aluminium,* v. 34, Sept. 1958, p. 545-547.

An automatic gang press, a columnless heavy press, a hydraulic deep drawing press and an impact extrusion press for nonferrous metals. (W24g, 1-52; EG-a39)

537-W. One Man Handles Flexible Heat Treating Line. F. V. Horak. *American Machinist,* v. 102, Oct. 20, 1958, p. 142-143.

(W27, W28n, 18-74)

538-W. New Roller Hearth Annealing Furnace With Electronic Control. *British Steelmaker,* v. 24, Oct. 1958, p. 330-331, 328.

Used for the heat treatment of stainless steel tubes on either a continuous or batch production basis. (W27g, J23; SS)

539-W. Cast Iron Sectional Boilers. Jan Severa. *Czechoslovak Heavy Industry,* no. 9, 1958, p. 22-24.

Efficiency of various boilers using different fuels.
(W11h, 1-52; CI, 17-57)

540-W. Oven Installation Bakes Paint on Metal Parts. *Industrial Finishing,* v. 34, Oct. 1958, p. 40, 44.

(W4k)

541-W. Factors in the Design of a Steel Plant Power System. A. J. F. MacQueen. *Iron and Steel Engineer,* v. 34, Oct. 1958, p. 92-100.

(W11g, 17-51, D-general)

542-W. A Survey of General and Specialized Machine Tools for Press-Tool Production. J. A. Waller. *Sheet Metal Industries,* v. 35, Aug. 1958, p. 595-602.

(To be continued.) (W25)

543-W. A Survey of General and Specialized Machine Tools for Press-Tool Production. J. A. Waller. *Sheet Metal Industries,* v. 35, Oct. 1958, p. 775-781, 791.

Types of milling machines including special types of machine which, in addition to normal milling, can affect other operation. (To be continued.) (W25r)

544-W. A Modern Melting Process for the Production of Metals and Alloys of Highest Purity. W. Scheibe. *Metall,* v. 11, 1957, p. 854-859. (Henry Brutcher, Altadena, Calif., Translation no. 4241.)

Previously abstracted from original. See item 212-W, 1958.
(W18s, X24f; 1-73)

545-W. World's Biggest Continuous Casting Plant for Steel. V. V. Ful'makht. *Metallurg,* no. 6, June 1958, p. 15-17. (Henry Brutcher, Altadena, Calif., Translation no. 4343.)

Previously abstracted from original. See item 414-W, 1958.
(W10a, D9q; ST)

546-W. (French.) **Vacuum Melting Furnaces With Consumable Electrodes.** H. Gruber. *Metallurgie et la Construction Mecanique,* v. 90, Sept. 1958, p. 673-695.

History of process, description of furnaces using consumable electrodes. Possible future developments of this type of furnace. Application and results in metallurgy. (W18s)

547-W. (German.) **Technical Directives of the Five-Year Plan for Foundries.** W. M. Schestopal. *Freiberger Forschungshefte,* v. B24-3, 1958, p. 84-112.

Production engineering and floor plans. (W19, E-general; 18-67)

548-W. (German.) **Gutterless Low-Frequency Induction Furnaces.** *Giesserei Praxis,* no. 17, Sept. 10, 1958, p. 342-343.

Uniform heating and melting procedures, perfect control of alloy composition, uniform quality of melt as well as relatively low installation costs and good productivity recommend this type of furnace for foundries. (W18a)

549-W. (German.) **Ideal Sliding Surfaces on Machine Tool Castings.** J. Tanner. *Giesserei-Praxis,* v. 18, Sept.

25, 1958, p. 367-368.
(W25, Q9p, 5-60)

550-W. (German.) **Air Heating Plants in the Metal Industries.** K. G. Muller. *Metall,* v. 12, Sept. 1958, p. 830-836.

Central and individual heating plants combining heat source and heat carrier used to heat drying ovens of paint shops. (W10e, W4k)

551-W. (German.) **Water Economy of the Hoesch-Westfalenhutte AG, Dortmund.** Maximilian Zur. *Stahl und Eisen,* v. 78, Aug. 21, 1958, p. 1191-1200.

(W10h; ST)

552-W. (Russian.) **Operation of Continuous Furnaces With Low-Pressure Burners.** D. E. Krasnozhen. *Metallurg,* v. 3, Sept. 1958, p. 23-25.

Burners are inadequately distributed. There is particular need for more burners in upper zones of furnace. Since there is no room to install additional burners, the need for greater heat can be met by enlarging nozzles of present burners. (W20h, 1-61, F21b)

553-W. (Russian.) **Industrial Frequency Induction Furnace for Annealing Copper Pipes Prior to Cold Bending.** I. K. Kopylov. *Vestnik Mashinostroeniya,* v. 38, Sept. 1958, p. 34-35.

(W27k, J23; Cu-b, 4-60)

554-W.* **Aluminum-Bronze for Pump Construction.** *Canadian Metalworking,* v. 21, Oct. 1958, p. 36, 38.

Corrosion and abrasion during pump usage are being overcome now that improved molding and pouring techniques have enabled the qualities of Al bronze to be utilized for machining. Ge properties of Al-bronze, high-Pb-Sn bronze (1103), cast steel (1201) and cast 316 stainless steel (1203); table of liquids which can be pumped with Al bronze. (W13d, 17-57; Cu-s, *Al*)

555-W. **Recent Advances in the Metallurgy of Zirconium and Titanium Alloys of Special Interest in Reactor Technology.** G. M. Adamson, J. O. Betterton, J. H. Frye and M. L. Picklesimer. Second United Nations International Conference on the Peaceful Uses of Atomic Energy. A/CONF.15/P/1993, 1958, 20 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Fabrication of Zircaloy-2 has been advanced by the development of a schedule which produces more nearly isotropic plate. Welding procedures now permit the field construction of complex structures of alpha Ti and perhaps Zr alloys. Zr alloys have been developed more resistant to radiation-induced corrosion in uranyl sulphate solution. 23 ref. (W11p, 17-57, F-general, K-general, R7k; Zr, Ti)

556-W. **Metal Fibers Beef Up Plastic Dies.** A. P. Maszucchelli. *American Machinist,* v. 102, Nov. 3, 1958, p. 94-95.

Longer wear, better heat properties and higher accuracy result when cast epoxy dies are filled with metal fibers. New technique where short fibers are flocked to outside wear surfaces improves die life. (W24n, H17; NM-d, 17-57)

557-W. **Continuous Heat Treatment With Automatic Control.** R. O'Donoghue and L. G. W. Palethorpe. *Automation Progress,* v. 3, Sept. 1958, p. 326-328.

Types of transfer furnaces; shaker hearth, rotating drum with helix walking beam, roller hearth. (To be continued.) (W27, W12r)

558-W. **Electric Furnace Developments.** P. F. Hancock. *Birmingham Metallurgical Society Journal,* v. 38, Sept. 1958, p. 89-104.

Review of construction, principal applications of direct arc, induction, resistor melting furnaces, induction heaters. (W18, 16-61)

559-W. **Hugh Vacuum Furnace for Degassing, Heat Treatment and Brazing of "Supermetals" at the North American Aviation Missile Plant.** *Industrial Heating,* v. 25, Oct. 1958, p. 1944-1946, 1948, 1950, 1952.

(W27n; 1-73)

560-W. **Supply-Voltage and Current Variations Produced by a 60-Ton 3-Phase Electric Arc Furnace.** B. C. Robinson and A. I. Winder. *Institution of Electrical Engineers, Proceedings,* v. 105, Aug. 1958, p. 305-324.

(W18s, D5)

561-W. **Aspects of Russian Engineering Industry.** *Machinery (London),* v. 93, Oct. 15, 1958, p. 864-881.

Activities of the First State Ball Bearing plant.
(W10, W25, T7d, 18-74)

562-W. **Gas Turbine Progress.** R. Tom Sawyer. *Mechanical Engineering,* v. 80, Nov. 1958, p. 102-110.

(W11m, T21b, T24b; SGA-h)

563-W. Use of Automatic Machinery in the Spray Painting Field. J. Arthur Weed. *Metal Finishing,* v. 56, Nov. 1958, p. 68-69.

Electrostatic, airless spraying and reciprocating-type spray machines. (W4j, W4g)

564-W. Bulk Handling of Metal Powders. A. E. Williams. *Metal Industry,* v. 93, Oct. 24, 1958, p. 349-351.

(W12c, A5a, 6-68)

565-W. High-Pressure High-Temperature Apparatus. *Metal Industry,* v. 93, Oct. 24, 1958, p. 354, 358.

Piston-cylinder apparatus with internal heater can be used to give pressures up to 50,000 atm. at temperatures of 5000° C. (W22, 2-62, 3-74)

566-W. Heat Treatment in Restricted Spaces. *Metallurgia,* v. 58, Oct. 1958, p. 185-187.

Advantages of continuous furnaces—rotary hearth, vertical conveyor and rotating tube types. (W27, 1-61)

567-W. Press Line Conveyors Raise Production. L. J. Kevitt and A. Weigl. *Metalworking Production,* v. 102, Oct. 17, 1958, p. 1834-1835.

(W12r, W24)

568-W. Repair of Large Bell of a Blast Furnace. V. A. Karasik. *Metallurg,* no. 5, May 1957, p. 8-9. (Henry Brutcher, Altadena, Calif., Translation no. 4333.)

Technique employing hard-facing for the repair of a damaged bell of a blast furnace suffering from gas leaks. (W17g; 18-71)

569-W. Conversion of Openhearth Furnaces From Oil to Gas Firing. V. P. Borodin. *Stal',* v. 17, no. 2, 1957, p. 124-129. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 479-W, 1957. (W18r, 1-52; RM-m35, ST)

570-W. Life of Steel Ingot Molds. S. M. Bobrovskii and A. G. Nikolaev. *Stal',* v. 17, 1957, p. 84-88. (Special Libraries Assoc. Translation Center, John Crerar Library, Chicago, Translation no. ASLIB-GB70.)

Previously abstracted from original. See item 477-W, 1957. (W19c, 17-57, 1-52; ST)

571-W. (Czech.) **Improved Arc Starting in Automatic Welding.** Vladimir Sulc. *Zvaranie,* v. 7, July 1958, p. 207-208.

(W29, K1, 18-74)

572-W. (Czech.) **Electrical Welding Equipment in the USSR.** Zdenek Hadrousek *Zvaranie,* v. 7, July 1958, p. 208-211.

Survey of production of welding machinery in the USSR. 7 ref. (W29)

573-W. (French.) **A Charge Preparation Station on the Charging Platform.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 96, May 1958, p. 5-8.

(W18d)

574-W. (French.) **Ejectors for Die Casting Molds. Standardization and Mass Production.** *Journal d'Informations Techniques des Industries de la Fonderie,* no. 96, May 1958, p. 11-12.

(W19g, E13)

575-W. (German.) **More Flexibility of Process and Increased Efficiency of a Multiple Wiredrawing Machine by Electronic Control.** Huppertz. *Draht,* v. 9, Aug. 1958, p. 302-304.

Regulation of speed in a three-step wire drawing machine by electronic control of the field circuits of motors driving the drawing reels. (W24k)

576-W. (German.) **How to Avoid Unnecessary Transportation in the Foundry.** Werner Riege. *Giesserei,* v. 45, Aug. 14, 1958, p. 474-477.

(W19, W12, 18-67)

577-W. (German.) **Automatic Molding Machine.** Waldemar Gesell. *Geisserei,* v. 45, Oct. 9, 1958, p. 642-647.

Automatic loading by roller conveyors, routing and sequence controlled electro-pneumatically. Improved production sequence of uniform height. (W19, W12, 18-67, 18-74)

578-W. (German.) **Electromagnetic Separators for Barrel Finishing Plants.** G. Nickel. *Metalloberflache,* v. 12, May 1958, p. 152-154.

Separation of parts and polishing material by electromagnet. (W3b)

579-W. (German.) **Use, Manufacture and Heat Treatment of Alloy Cast Steel Rolls. Pt. 3.** Heinz Uhilitzsch and Gerhard Radomski. *Neue Hutte,* v. 3, Aug. 1958, p. 475-482.

10 ref. (W23k; 17-57, AY)

580-W. (German.) **Application and Advantages of Die Inserts.** W. Kick. *Werkstatt und Betrieb,* v. 91, Sept. 1958, p. 557-560.

(W19n, 1-52, 17-51)

581-W. (German.) **Machine Tool Automation in Great Britain.** F. Koenigsberger and J. K. Royle. *Werkstattstechnik und Maschinenbau,* v. 48, Sept. 1958, p. 461-468.

9 ref. (W25; 18-74)

582-W. (German.) **Economic Distribution of Acetylene in a Welding Shop.** Ed. Gutjahr. *Zeitschrift für Schweisstechnik,* v. 48, Oct. 10, 1958, p. 264-272.

(W29e, A5g)

583-W. (Italian.) **Machining of Metals by Hot Plastic Deformation. Pt. 12. The Recoil Hammer.** Romeo Giusfredi. *Rivista di Meccanica,* v. 9, July 19, 1958, p. 37-39.

Description of recoil hammer; use; advantages and disadvantages; comparison with single and double-acting hammers. (To be continued.) (W25, G17)

584-W. (Russian.) **Modern Hot Blast Cupolas for Steel Melting Plants.** N. V. Zinov'ev. *Stal',* v. 18, Sept. 1958, p. 796-799.

(W18d; ST)

585-W. (Russian.) **Selecting the Main Parameters of an Electromagnetic Stirrer for Arc Furnaces.** N. S. Siunov, M. G. Rezin and A. I. Kholodov. *Stal',* v. 18, Sept. 1958, p. 802-806.

Experiments with 180-ton electric furnace made with a nonmagnetic steel casing. By correct selection of main parameters considerable economies were made in electrical energy. Capital cost of the installation was offset in 1.5 to 2 years. (W18s, D5f)

586-W. (Russian.) **Increasing the Durability of Small Ingot Molds.** V. M. Tokarev. *Stal',* v. 18, Sept. 1958, p. 861-864.

New alloys which reduce weight of ingot molds. With introduction of smooth-walled molds their durability increased by 32.3%, and with use of ribbed walls, there was a further 10.3% in durability. (W19c; ST)

587-W. Indium as an Anode Material. T. L. Boswell. *Electrochemical Society, Journal,* v. 105, May 1958, p. 239-241.

Indium and its alloys with Bi and Pb evaluated as energy producing electrodes in small sealed cells. 6 ref. (W3h; In, In-b, Bi, Pb)

588-W. Expansion Allowance in Basic Open Hearth Port Ends. L. L. Wells, Jr., and T. P. Greaney. *Journal of Metals,* v. 10, Apr. 1958, p. 277-280.

6 ref. (W18r, B19d)

589-W. Hot Top Practice at Lukens Steel. R. L. Bunting, Jr. *Journal of Metals,* v. 10, Aug. 1958, p. 525-526.

(W19c, D9k; ST)

590-W. Some Considerations Regarding Consumable-Electrode Inert-Gas Welding Filler Wire. L. M. Petryck. *Welding Journal,* v. 37, Nov. 1958, p. 1086-1089.

It is proposed the electrode wire be coiled to a specified diameter set or cast for more intimate contact at discharge end of contact tube to remedy erratic burn-off behavior. (W29h, K1d)

591-W. Tungsten Tool Steel Extruder Die Insert Ups Production 200%. *Western Metalworking,* v. 16, Sept. 1958, p. 45.

Hot work toolsteel for tube extrusion die insert where high compressive strength is required. Insert reaches 1000° F. in service. (W22a, 1-66; TS-k, *W, Cr*)

SECTION X

INSTRUMENTATION

Laboratory and Control Equipment

1-X. Nickel Alloys With Special Properties. C. Gordon Smith. *Birmingham Metallurgical Society, Journal,* v. 37, Sept. 1957, p. 553-565.

Ni and Ni-Fe alloys, their use because of low expansion properties in instruments, temperature control devices and glass-to-metal seals. Constant modulus alloys for watch hairsprings and magnetic alloys for permanent magnets and ultrasonic applications. (X general, 17-57; SGA-s, SGA-b, SGA-n, Ni)

2-X. Primary Elements for Temperature Measurement. H. G. Oughton. *Instrument Engineer,* v. 2, Oct. 1957, p. 76-82.

Construction and performance features of temperature-sensitive elements of resistance thermometer, thermocouple and radiation pyrometer types. (X9, 1-52)

3-X. (German.) **Trend in Design of Force Measuring Instruments on Testing Equipment.** G. Sachs. *Draht,* v. 8, Aug. 1957, p. 352-357.

Principles and systems for measuring forces in testing; combinations of hydraulic, mechanical and electric indicating mechanisms; magnitude of forces and desired precision of measurement determine the selection of the equipment. 5 ref. (X29, 17-51)

4-X. (Polish.) **Magnetic Plates in Telecommunication Industry.** T. Konopinski. *Hutnik,* v. 24, July-Aug. 1957, p. 311-317.

Ferrosilicon, ferronickel, ferrocobalt and ferroaluminum plates, their properties and application in telecommunication industry. 30 ref. (X15p, 17-57; SGA-n)

5-X. (Polish.) **Wound Cores and Cut-Out Patterns for Telecommunication Uses.** T. Konopinski. *Hutnik,* v. 24, July-Aug. 1957, p. 317-323.

Characteristics and application of ring, tape and plate cores. Problems of plate thickness and insulation selection for most suitable core shapes. 12 ref. (X15p, 17-7; SGA-n)

6-X. (Polish.) **Device for Measuring Power Loss of Continuous Transformer Plates.** J. Siewierski. *Hutnik,* v. 24, July-Aug. 1957, p. 333-334.

Basic characteristics of device built at Institute of Iron Metallurgy in Poland. 2 ref. (X26; SGA-r, AY)

7-X. Easier Check on Surface Finish. *British Steelmaker,* v. 23, Oct. 1957, p. 312-313.

Interference microscope for assessing metal surfaces easily estimates surface irregularities to 1 micro in. (X3q, S15)

8-X. Control of Atmosphere Generators. R. R. Swain. *Iron and Steel Engineer,* v. 34, Sept. 1957, p. 152-159.

Methods of sampling, measurement, analysis and control for exothermic and endothermic generators. Instruments for use with exothermic generator include fuel-air ratio meter, gas flow meter, specific gravity meter, combustibles analyzer and recording indicators and controllers; instruments used with endothermic generators include carbon dioxide and dew point analyzers. (X7g, X7j, W28q)

9-X.* An Apparatus for Measurement of the Occlusion of Hydrogen by Metals. M. Kotyk, J. K. Magor and H. M. Davis. *Metallurgia,* v. 56, Sept. 1957, p. 153-155.

Apparatus for determining amount of hydrogen occluded at various temperatures. 6 ref. (X21; H)

10-X. (French.) **Gamma Ray Device for the Detection of Cavities in Half-Run Products at Rolling Tempera-**

ture. A. Kohn. *Institut de Recherche de la Sidérurgie,* Publications, v. A. no. 163, July 1957, p. 1-23.

Device detects the large defects inside thick rolled products passing continuously from the roller through hard gamma radiation provided by a radiocobalt source. Measurements are made by new scintillation counter. 2 ref. (X8, X2, S19, W23)

11-X. (French.) **Instrument for Static Tests and Triaxial Stress Fatigue Tests.** G. Welter and A. Choquet. *Métaux-Corrosion-Industrie,* no. 383-384, July-Aug. 1957, p. 300-312.

Theory of deformation for tridimensional stress required experimental confirmation. Description of new instrument. 5 ref. (X29, Q27, Q7, 1-53)

12-X. (Russian.) **Electronographic Analysis in the Study of Metals.** M. I. Tsipin. *Metallobedenie i Obrabotka Metallov,* no. 5, May 1957, p. 62-64.

Instrument for study of molecular structures. (X3)

13-X. (Russian.) **Apparatus for Exact Determination of Electrical Resistance of Metals and Alloys at High Temperature in Vacuum.** S. D. Gertsriken and A. V. Prograshchenko. *Zavodskaya Laboratoria,* v. 23, Aug. 1957, p. 974-975.

(X25, P15g, 2-62, 1-73)

14-X. Precision Castings Guide Radar Signals. K. L. Herrick and Samuel Lipson. *Modern Castings,* v. 33, Jan. 1958, p. 29-31, 68.

Investment castings in the manufacture of wave guide components. (X15q, 17-57; 5-62)

15-X. True Stress Vs. Elongation Recorder. D. E. Driscoll and T. S. DeSisto. Watertown Arsenal Laboratory. *U. S. Office of Technical Services,* PB 131104, July 1955, 22 p. $.75.

Electronic extensometer and recorder that will autographically record the true stress versus elongation curve. It can be used on practically all ferrous and nonferrous metals. (X29p)

16-X. High Vacuum Filament Furnace for Gas Analysis of Metals. G. A. Consolazio and W. J. McMahon. Watertown Arsenal. *U. S. Office of Technical Services,* PB 131121, Oct. 1955, 13 p. $.50.

(X24f, S11r)

17-X.* Sampling and Analysis for Impurities in Liquid Sodium Systems. J. R. Humphreys, Jr. Paper from "Liquid Metals Technology", Pt. 1, Chemical Engineering Progress Symposium Series, p. 7-10.

Vacuum distillation apparatus and technique devised for sampling liquid sodium in reactor coolant systems and analyzing for oxides and metallic impurities. Equipment can be modified and used for Hg, Cs, Rb, K, Cd, Zn, Mg or Li. 13 ref. (X21m, 1-73, S11; 14-60)

18-X.* Production of Close-Tolerance Brass Strip. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 55-59.

Baldwin Instrument Co. automatic nucleonic thickness gage control equipment installed on the Robertson four-high mill at the Birmingham Works of D. F. Tayler and Co., Ltd. (X20c, W23c, 1-52; Cu-n)

19-X. (German.) **First Experience With the Use of Electronic Balances in an Iron Foundry.** Helmut Knüppel, Gert Wiethoff and Wolfgang Dorr. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1752-1759.

(X20h, W19, 1-53)

20-X. (German.) **Machines and Equipment for Testing Metallic Materials.** Hermann Mintrop. *VDI Zeitschrift,* v. 99, Sept. 21, 1957, p. 1348-1349.

17 ref. (X general, 1-52)

21-X. (German.) **Progress in the Area of Technical Temperature Measurement.** H. Lindorf. *Draht,* v. 18, Oct. 1957, p. 435-437.

Pyrometers of various construction and for various applications. 10 ref. (X9r)

22-X. Gage of Strip Measured by Electro-Mechanical Device. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1413-1414.

Electro-mechanical device translates dial positions from X-ray gage measuring thickness of steel strip into thousandths of an inch. (X20c, S14e, F23; ST, 4-53)

23-X. Non-Contact Automatic Gauge Control. *British Steelmaker,* v. 24, Jan. 1958, p. 18-21.

Nucleonic thickness gage operates cold strip mill to give closer tolerances. (X20c, W23c, 1-61, 18-74, S14e; Cu, ST)

24-X. Industrial Nucleonic Gaging. J. E. Reider. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 360-365.

(X20c, S14e)

25-X. (Russian.) **Automation of Charging and Control of Charge Level in Cupola Using Radioactive Isotopes.** G. K. Miroshnichenko, A. G. Vasilev,

V. I. Shcherbakov and D. A. Lure. *Liteinoe Proizvodstvo,* Aug. 1957, p. 14-15. 3 ref.

(X13f, W18d, 1-59, 18-74)

26-X. (Russian.) Technical Measuring Methods in Machine Building. D. D. Malyi. *Stanki i Instrument,* v. 28, Nov. 1957, p. 4-7.

Advances in measuring instruments, including extensive use of electronic devices, have contributed to raising metalworking industry to new level. (X general, 1-52)

27-X. Baldwin Automatic Control System for a Rolling Mill. *Machinery* (London), v. 92, Jan. 17, 1958, p. 157-158.

(X20c, W23c, 18-74; Cu, ST)

28-X. (German.) Measuring Methods and Instruments for the Control and Location of Faults of Electrical Installations in Ironworks. Kurt Stahl. *Stahl und Eisen,* v. 78, Jan. 23, 1958, p. 94-100.

(X10, X25, D-general)

29-X. Interferometer for Checking the Parallelism of Slip Gauges. *Machinery (London),* v. 92, Feb. 14, 1958, p. 375-377.

(X20a, S23)

30-X. (Russian.) Device for Investigation of Damping Vibration in Metals. M. I. Kurmanov, I. V. Navrotskii and Zh. F. Yanushevskaya. *Zavodskaya Laboratoriya,* Jan. 1958, p. 101-103.

(X28m)

31-X. (Russian.) Device for Photographing Surface of Cylindrical Objects During Corrosion Tests. S. N. Alekseev. *Zavodskaya Laboratoriya,* Jan. 1958, p. 108-109.

(X5g, R11)

32-X.* Instrumentation for the Melting of Non-Ferrous Metals. D. W. Brown. *British Foundryman,* v. 51, Mar. 1958, p. 128-136.

Instruments available for combustion control, temperature measurement and control (especially thermocouples), nitrogen degassing gages, and melt-quality determination. (X9, X13, E10; EG-a38)

33-X. Three-Dimensional Toolmaker's Microscope. Walter P. Christoph. *Metalworking Production,* v. 102, Apr. 18, 1958, p. 684-686.

(X3r)

34-X. Measuring Tapers Without Tears. *Metalworking Production,* v. 102, Apr. 18, 1958, p. 688-690.

Device which simplifies difficult measuring problems. (X20a; ST)

35-X. Russian Automatic Machine Grades Cylinder Rollers. *Metalworking Production,* v. 102, Apr. 18, 1958, p. 691-692.

In roller grading machines at the Moscow automatic bearing plant, measuring airjets actuate solenoids to direct each roller into one of 23 hoppers according to a length of tolerance of 0.003 in. and a diameter tolerance of 0.00008 in. Production rate is 1800 rollers per hr. (X6, T7d; 18-74)

36-X. (German.) Strain Gages for Industry. Gisbert Kaliske. *Industrieblatt,* v. 58, Mar. 1958, p. 73-77.

Constructions of apparatus; measuring methods. (X28j)

37-X. (German.) Modern Gages and Controllers. *Industrieblatt,* v. 58, Mar. 1958, p. 83-85.

Impressions from International Congress on measuring techniques and automation in Dusseldorf, 1957. Short description of apparatus; strip thickness regulator, dosimeter for gamma and X-rays, controls using punched cards, electronic counting devices, electronic precision indicator, sorting device and noise tester. (X20, X2, X6)

38-X. (German.) Gages and Testing Apparatus for Efficient Manufacturing. *Industrieblatt,* v. 58, Mar. 1958, p. 85-87.

Precision gages, including screw gages, optical gages, "tool microscope", hardness testers, mounting and measuring projectors and sorting machines. (X20, X6)

39-X. (Russian.) Coercive-Force-Meter to Control Quality of Thermal Treatment of Steel Parts. A. M. Ylgard. *Zavodskaya Laboratoriya,* v. 23, no. 12, 1957, p. 1054-1505.

(X11, J-general, S13h; ST)

40-X. Autographic Stress-Strain Recorders. Raymond R. Bouche and Douglas R. Tate. *ASTM Bulletin,* no. 228, Feb. 1958, p. 33-42.

93 ref. (X29q)

41-X. Strain Stress Computer. Thomas S. DeSisto and David E. Driscoll. *ASTM Bulletin,* no. 228, Feb. 1958, p. 46-49.

(X29q)

42-X.* A New Dynamic Test Facility for Aqueous Corrosion Studies. S. Greenberg, J. E. Draley and W. E. Ruther. *Corrosion,* v. 14, Apr. 1958, p. 191t-192t.

New high-pressure, high-temperature dynamic aqueous corrosion test

loop. Maximum operating conditions are 360° C., 3000 psi., 20 to 30 ft. per sec. velocity. Design allows flexibility of operation and precise control of corroded composition. (X1c, R4)

43-X. Apparatus for Determination of Hydrogen in Steel. Lars Bjerkerud. *Jernkontorets Annaler,* v. 141, no. 2, 1957, p. 90-94. (Iron and Steel Institute Translation no. 613.)

Previously abstracted from original. See item 49-X, 1957. (X21, 1-2, S11; ST, *H*)

44-X. (German.) **Foil Thickness Meter.** W. Hellwig. *Aluminium,* v. 34, Apr. 1958, p. 206-207.

Two meters, one for thick strip and the other for foil make contact with the stock and convert mechanical changes into electrical signals which are recorded. (X20c, S14c, F23, 4-56)

45-X. (Russian.) **More Efficient Calibration of Hexahedral Rolled Steel.** A. A. Nefedov and B. M. Ilyukovich. *Metallurg,* v. 3, Mar. 1958, p. 22-24.

(X20, W23; ST)

46-X. (Russian.) **New Machines for Testing Strength of Metals.** B. A. Avdeev. *Zavodskaya Laboratoriya,* v. 24, Feb. 1958, p. 253-254. (X29, 1-52, Q27)

47-X. Apparatus for Measuring the Depth of Cracks. Lutz Brand. *Stahl und Eisen,* v. 77, May 2, 1957, p. 576-581. (Iron and Steel Institute, Translation no. 621.)

Previously abstracted from original. See item 53-X, 1957. (X8, 1-52, 9-72)

48-X.* (German.) **Measurement of X-Ray Interference Curves With the Scintillation Counter.** Hermann Moller and Friedhelm Brasse. *Archiv für das Eisenhüttenwesen,* v. 28, Dec. 1957, p. 831-837.

Tests with the scintillation counter for the measurement of intensities in X-ray interference lines resulted in considerable advantages over the conventional Geiger-Muellr counter. The efficiency was ten times higher, permitting three times higher counting accuracy. A differential discriminator provided for the suppression of cosmic rays and of the impulses emitted from the secondary electron amplifier. 19 ref. (X2c)

49-X.* Methods of Control of Strip Dimensions on Hot Finishing Mills. R. A. Phillips. *Iron and Steel Engineer,* v. 35, May 1958, p. 100-106.

To hold finishing dimensions, hot strip mill must be set up accurately and stand speed regulated accurately. For this, positioning controls on screwdowns and speed regulators are necessary. Some type of automatic set-up of both screwdowns and speeds is foreseen. 5 ref. (X20c, W23c, 1-66)

50-X. An Apparatus for Measurement of Thermal Conductivity of Solids at Low Temperatures. Robert L. Powell, William M. Rogers and Don O. Coffin. *National Bureau of Standards, Journal of Research,* v. 59, Nov. 1957, p. 349-355.

7 ref. (X24, P11h, 1-53, 2-63)

51-X.* The Adiabatic Vacuum Calorimeter From 600 to 1600° C. I. I. Backhurst. *Iron and Steel Institute, Journal,* v. 189, June 1958, p. 124-134.

Upper temperature limit of the adiabatic vacuum calorimeter has been extended from 950 to 1600° C. It is adapted for either solid or liquid metal specimens and has been applied to the measurement of the thermal capacities of Ti from 590 to 1080° C., a 44% Cr-Fe alloy from 500 to 1100° C. and an alloy steel (1.09% Cr, 0.69% Mn, 0.315% C, and 0.20% Si) from 540 to 1600° C. 12 ref. (X24e, P11; Ti, Cr, Fe, AY)

52-X.* Three-Dimensional Tape-Controlled Inspection System. H. J. Elton. *Machinery (London),* v. 92, June 6, 1958, p. 1329-1332.

To permit continuous and automatic inspection of workpieces in three dimensions, a special measuring head has been developed which is sensitive to both vertical and horizontal deflections of the stylus. This head may be mounted on a machine arranged for automatic tape control, and the component may be caused to follow a path such that the various surfaces to be inspected are carried past the stylus. (X20, 1-52)

53-X. The Use of a Computer in a Rolling Mill Office. R. G. Massey. *Process Control and Automation,* v. 5, May 1958, p. 190-195.

Work carried out by the Operational Research Department of the British Iron and Steel Research Association. (X14, 1-52, F23, A9)

54-X.* (Russian.) **Instruments for Maximum Geometric Measurements, Accessory Electromagnets for Coercive Force Meters Used for Control-**

ling Quality of Thermal and Chemico-Thermal Treatment of Steel and Cast Iron Products. M. N. Mikheev. *Fizika Metallov i Metallovedenie,* v. 5, no. 1, 1957, p. 44-52.

Coercive force meters equipped with accessory electromagnet can be used for accurate control of quality of heat treated products. All ranges of sizes of products encountered may be controlled whose hardened layer may vary from the thinnest nitrided layer to cases of considerable thickness. The instrument and process. 22 ref. (X11, 1-53, J28; ST, CI)

55-X. Inspecting the Micro-Inch Surface Finish. *Australasian Manufacturer,* v. 42, Mar. 15, 1958, p. 44-50. (X3q, 1-53, S15)

56-X. Differential Calorimeter for Heats of Formation of Solid Alloys. Heats of Formation of Alloys of the Noble Metals. R. A. Oriani and W. K. Murphy. *Journal of Physical Chemistry,* v. 62, Mar. 1958, p. 327-331.

A twin differential, high-temperature calorimeter. Experimental results for the enthalpy of formation of solid Ag-Au, Au-Cu and Ag-Cu alloys.
(X24e, P12r; Ag-b, Au-b, Cu-b)

57-X. (French.) **A New Surface Irregularity Measuring Instrument.** E. Fukushima. *Métaux-Corrosion-Industries,* no. 391, Mar. 1958, p. 125-132.

Instrument is based on the principle of optical reflection and its principal advantage is therefore freedom from vibrations such as encountered in instruments based on direct needle tracing of surface irregularities. Other advantages are rapidity of measurements, portability, ability to test directly and non-destructively with no special specimens required. Instrument gives a statistical measure of surface irregularities. 6 ref.
(X23p, S15d, 1-53)

58-X. (German.) **Platinum in Chemical Laboratory Apparatus.** Manfred Röhm. *Chemi für Labor und Betrieb,* v. 9, Apr. 1958, p. 144-148. (X21, 17-57; Pt)

59-X.* An Automatic Gage Control System for Tandem Cold Mills. N. S. Walker, J. W. Cook and J. W. Wallace. *Iron and Steel Engineer,* v. 35, July 1958, p. 124-132.

Controller consisting of pre-amplifier, integrator and power amplifier is standard in design and can be applied to any steel rolling mill where gage can be controlled by tension; applicable to Al mills where gage is controlled by tension or mill speed, or by a combination of both. (X20c, W23)

60-X.* Temperature Controller for Heat-Treatment of Pipe Welds. D. Birchon. *Welding and Metal Fabrication,* v. 26, July 1958, p. 256-258.

Prototype portable instrument to control the heat-treatment temperature of local areas of completed structures in the temperature range 600° C. upwards, within 10° C. The equipment views a small area of the hot surface directly through the heating flame, and on opposed current control circuit which gives a full-scale meter deflection for the working range of 600-900° C. 5 ref.
(X9s, J-general, 4-60, 7-51)

61-X.* (German.) **Surface Treatment of Aluminum for Electrolytic Condensers.** P. Werner. *Nachrichtentechnik,* v. 8, June 1958, p. 269-276.

Surface treatment of Al is one of the most important aspects in the production of condensers; a reduction in the size of the case is made possible for the miniature type used in communications. Methods of treatment are mechanical, spraying, chemical and electrochemical. The electrochemical process has the best reproducibility.
(X15, T1e, L-general; Al-b, 17-57)

62-X.* (German.) **Experiments and Observations on the Development of an Oxide-Type Thermo-Element.** Wilhelm Anton Fischer and Gert Lorenz. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 293-300.

For the measurement of temperatures between 300 and 1750° C. thermo-elements from $Pt/Cr_2O_3/Cr_2O_3 + 1\%\ TiO_2/Pt$ representing a semiconductor were tried and thermoforces and thermovoltages were observed. Reversibility and reproducibility were satisfactory even after 24 hr. of heating. The thermovoltages were extrapolated up to 2100° C., beyond which the thermoforces apparently become negligible. Tables and diagrams are given for thermoforces and voltages as function of temperature. 12 ref.
(X9g, 17-57; Cr, Pt, Ti)

63-X. (German.) **Application of Scintillation-Counters on "Counting Tube Goniometers".** Franz Bollenrath and Hans Krings. *Archiv für das Eisenhüttenwesen,* v. 29, May 1958, p. 309-312.

For microstructure investigations on Cu, Al, carbonyl iron and on steels with about 16% Cr and 30% Ni, a sodium iodide scintillation counter together with molybdenum rays was used. The ratio between line intensity and background intensity was improved, permitting a considerably better discrimination against fluorescent rays and retarding rays. Types of counting instruments are compared in tables. 5 ref. (X27c, M23n; SS, *Cr, Mo, Ni*)

64-X. (German.) **Magnetic Materials in Heavy-Current Engineering.** O. Twerdy. *Deutsche Elektrotechnik,* Dec. 1957, p. 103-104.

(X11g, 17-57; SGA-n)

65-X. (German.) **Powder Metal Permanent Magnets.** H. Fahlenbrach. *Deutsche Elektrotechnik,* Dec. 1957, p. 518-524.

15 ref. (X11g, 17-57; SGA-n, 6-71)

66-X. (German.) **Manganese-Bismuth Permanent Magnets.** A. B. Altmann. *Deutsche Elektrotechnik,* Dec. 1957, p. 525-527.

Methods of production and characteristics. 16 ref. (X11g, 17-57; Bi, Mn, SGA-n)

67-X. (German.) **New Ultrasonic Pulse Generator for Nondestructive Testing of Material.** Werner Boehme and Hubert Hoetzel. *Siemens Zeitschrift,* Apr. 1958, p. 222-230.

(X8, S13g, 1-52)

68-X. (Japanese.) **Sensitive Dynamometer Equipped With Strain Gages.** M. Honda and M. Kanai. *Mechanical Laboratory, Journal,* v. 11, Mar. 1958, p. 61-66.

Measurement of comparatively small cutting forces. General description of construction; characteristics, experimental results. (X28h, G17)

69-X. Applying Infrared Analyzers to Control Furnace Atmospheres. J. L. Garrison. *Automation,* v. 5, June 1958, p. 46-48.

(X7j; W27n, 1-52)

70-X. Weighing Enters New Fields Via Digital-Data Scales. G. L. McKenna. *Iron Age,* v. 182, July 24, 1958, p. 81-83.

Newest scales will transmit weight data electronically to a variety of remotely located business machines —typewriters, tape punches, adding machines, and digital controllers. (X20g, A5, 18-74)

71-X. Measuring Techniques for Controlling Electrical Installations in Steel Works and for Detecting Faults. Kurt Stahl. *Stahl und Eisen,* v. 78, Jan. 23, 1958, p. 94-100. (Iron and Steel Institute Translation no. 881.)

Previously abstracted from original. See item 28-X, 1958. (X10, X25, D-general)

72-X. (German.) **Materials for Temperature Compensation of Measuring Instruments.** Anton Schwarz. *VDI-Zeitschrift,* v. 100, Jan. 1, 1958, p. 23-24.

(X-general, 2-61)

73-X. Apparatus for Precise Determination of Dynamic Young's Modulus and Internal Frictions at Elevated Temperatures. M. E. Fine. *Review of Scientific Instruments,* v. 28, Aug. 1957, p. 643-645.

Apparatus for determining Young's modulus and internal friction of metals at temperatures to 800° C. (X28, Q21, Q22, 2-62)

74-X. (Russian.) **Complex Automatic Control in Iron and Steel Industry.** *Stal',* June 1958, p. 481-485.

(X-general, D-general)

75-X. Creating Test Atmospheres at —260° F. M. John Brown and Gordon V. Thompson. *ASTM Bulletin,* no. 231, July 1958, p. 59-61.

Portable laboratory cold flask permits operation of a dry atmosphere test chamber at temperatures as low as 260° F. for about 12 hr. (X29r, 1-53, 1-67)

76-X. (French.) **Servo-Pyrometer. Measurement of Infra-Red Temperatures.** A. Peuteman. *Automatisme,* v. 3, June 1958, p. 214-217.

(X9r, S16)

77-X.* (French.) **Device for Measuring Internal Friction in Rigid Specimens.** Gaston Collette. *Comptes Rendus,* v. 246, May 12, 1958, p. 2756-2758.

Device makes it possible to measure, at about atmospheric temperature, coefficient of internal friction of thin strips of metal subjected to low-frequency alternate stresses. Limit of solubility of nitrogen in ferrite at 100° C. was determined. (X28, 1-53, Q22)

78-X. (Czech.) **Apparatus for Differential Thermal Analysis.** Antonin Bla-

zek and Jan Halousek. *Hutnické Listy,* v. 13, 1958, p. 505-509.

Requirement for experimental unit. Simple apparatus designed on principle of galvanometric amplifier for automatic direct recording of differential thermal analysis curves. Technical conditions important to correct functioning of apparatus. 13 ref. (X9s)

79-X. (Russian.) **Investigation and Choice of Alloys for High-Temperature Thermocouples.** A. A. Rudnitskiy and I. I. Tyurin. *Zhurnal Neorganicheskoi Khimii,* no. 5, 1956, p. 1074-1090.

Alloys for high-temperature thermocouples, operating in air, stable during prolonged operation at 1350 to 1550°, and suitable for short duration up to 1800°. The thermal electrodes investigated were pure Rh, alloys of Pt with Rh, and triple alloys Pt-Rh-W and Pt-Rh-Re. (X9q, 17-57; Rh, Pt)

80-X. A High-Temperature Vacuum Quench Furnace. S. B. Austerman, G. M. Wolten and C. T. Broman. *U. S. Atomic Energy Commission, NAA-SR-2312,* 1958, 13 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.) $.50.

Design and operation of a furnace for heating and quenching refractory specimens in vacuo or controlled atmosphere. The specimen can be dropped at will from the heated zone into a quenching cup. The furnace has been operated at temperatures as high as 2400° C. (X24f, W27n, 1-73)

81-X. Automatic Control of a New Continuous Bloom Reheating Furnace. *British Steelmaker,* v. 24, July 1958, p. 218-219.

(X9s, W10h, 1-52)

82-X. Why Not Ceramic as a Material for Gages? Carl G. Erickson. *Machine and Tool Blue Book,* v. 53, Sept. 1958, p. 129-131.

(X20, 17-57; NM-f)

83-X. A Rotatable-Magnet Permeameter. R. K. Tenzer and M. A. Bohlmann. Indiana Steel Products Co. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131352, July 1956, 9 p. $.50.

Permeameter which derives the variable magnetomotive force across its air gap from the rotation of a permanent magnet. In the common permeameter, the variable magnetic field is provided by an electric current. The general purpose of the device is the determination of the magnetic properties of a test specimen and, in particular, visual indication of the major or minor hysteresis loops of a test specimen under varying magnetic field conditions. (X26, 1-53)

84-X. An Eddy Current Thickness Tester for Copper Plated on Uranium. Arthur P. Holt and Louis H. Cook. *U. S. Atomic Energy Commission DP-252,* 1958, 11 p. (Available from U. S. Office of Technical Services, Washington 25, D. C.)

Instrument measures thickness by the eddy current principle and is usable in the range of 0.004 to 0.012 in. with an accuracy of 5%. With minor modifications and adjustments the instrument may also be used to measure thicknesses as great as 0.035 in., of either Cu or Al, on any substrate whose specific resistivity approximates that of U. (X20c, 1-69; Cu, U, 8-62)

85-X. State of Development of Thermal Radiometer. A. Pfenninger, H. E. Henry, M. Godet and C. A. Wogrin. Quantum Inc. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131746, Mar. 1958, 57 p. $1.50.

Design and manufacture of the components of a thermal radiometer; mathematical analyses of heat transfer and control system problems. Forming a cone by electroforming technique. Adhesives of epoxy resins filled with Al powder developed to bond wires onto the system's Cu sink. (X2, 17-57, L18, K12)

86-X Electrical Strain Measurements at High Temperatures. James E. Starr. Paper from "Sheet Materials for High-Temperature Service", American Society for Metals, 1958, p. 37-50.

Three most important characteristics of resistance material for precision resistor application are temperature coefficient of resistance stability and high resistivity. Stability of several well-known strain gage alloys. (X28j, 17-57)

87-X. (Russian.) **Extensometer for Measuring Static Deformation at Temperature of 450°.** E. Yu. Nekhendzi and N. G. Tisenko. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 872-874.

3 ref. (X29p)

88-X. (Russian.) **Device for Electropolishing and Etching Metallographic Microsections.** L. Ya. Popilov. *Zavodskaya Laboratoriya,* v. 24, no. 7, 1958, p. 890-892.

(X4e, X4f)

89-X.* **Experimental Approaches to Radiation Effects.** J. C. Wilson. Paper from "Effects of Radiation on Materials", 1958, Reinhold Publishing Corporation, p. 48-98.

Factors involved and difficulties encountered in designing and performing experiments to measure radiation effects. Reactors as source of radiation. Experimental facilities in available research and test reactors. Mechanical and safety considerations and experiment design. 96 ref. (X2, 1-53, 2-67)

90-X.* **The Care of Platinum Thermocouples.** H. E. Bennett. *Platinum Metals Review,* v. 2, Oct. 1958, p. 120-123.

Precautionary methods to extend thermocouple life; effect of prolonged heating; contamination; embrittlement, creep test data; in-service failure. (X9q, 17-57; Pt)

91-X. (Russian.) **Torque and Pressure Measuring Instruments.** V. I. Petrikeev. *Stal',* v. 18, Aug. 1958, p. 728-729.

(X29, X12)

92-X.* (German.) **Temperature Measuring Equipment.** H. Kluge. *Giesserei Praxis,* no. 16, Aug. 25, 1958, p. 316-319.

Importance of accurate temperature measuring for all installations producing or utilizing heat. Depending on temperatures involved or materials concerned, certain instruments can be used, operating on electrical, optical and sometimes chemical principles. Metals and metal-alloys which make up these devices decide range of temperatures within which devices can be applied. Resistance thermometers, thermocouples, pyrometers described. (X9)

93-X.* **Width Meters Trim Strip Waste.** *Steel,* v. 143, Oct. 20, 1958, p. 182, 185.

A width gage uses photocell detectors which follow the edges of the hot strip by the radiation they emit. Eectromechanical circuitry translates what the photocells see into a running record of strip width. A new width meter uses a split beam of light from a point source, instead of radiation from the strip itself, to monitor the width of the strip. (X20, W23c, 1-53)

94-X. **Army Uses Sun.** *Chemical and Engineering News,* v. 36, Oct. 13, 1958, p. 35-36.

Description of solar furnace, proposed applications. (X24f, 16-63)

95-X. **An Instrument for the Measurement of Stress in Electrodeposits.** T. P. Hoar and D. J. Arrowsmith. *Institute of Metal Finishing, Transactions,* v. 43, 1956-1957, p. 354-368.

Metal is deposited on one side of a thin metallic strip fixed at the bottom; to the top is attached a light armature of soft iron. The stress in the deposit is determined by measuring the current through a solenoid that provides a restoring force on the armature to prevent the strip from bending. 7 ref. (X29q, Q25, 8-62)

96-X. **A High Temperature Centrifuge for Creep, Rupture, and Bend Tests.** I. I. Kornilov. *Journal of Metals,* v. 10, Mar. 1958, p. 187-189. 13 ref. (X20k, Q3q, Q5, 1-53)

97-X. (Italian.) **Determination of Total Water Content and Humidity in Electrode Coverings.** R. Botisk and F. Corbelli. *Rivista Italiana della Saldatura,* v. 10, Mar-Apr. 1958, p. 45-50.

Three methods (Gayly and Wooding, Jannasch and Fischer) used to determine total water content of basic electrode coverings; one (Gorbach) to determine humidity. Techniques and apparatus. (X21, W29h)

98-X. **Automation of Cupola Charging and Stockline Control With the Use of Radioisotopes.** G. K. Miroshnichenko. *Liteinoe Proizvodstvo,* no. 8, Aug. 1957, p. 14-15. (Henry Brutcher, Altadena, Calif., Translation no. 4341.)

Previously abstracted from original. See item 25-X, 1958.
(X13f, W18d; 1-59, 18-74)

99-X. (German.) **New Developments in Radiography and Image Intensification.** Heinrich Nassenstein. *Schweissen und Schneiden,* v. 10, Sept. 1958, p. 376-379.

Xeroradiographic method, superconoscope, solid-state light amplifier. 11 ref. (X2, S19)

100-X. **Total Radiation Pyrometers.** *Castings,* v. 4, Sept. 1958, p. 32-34.

(X9r, S16b)

101-X. New Techniques Revealed at West Coast Lubrication Conference. Ernest Rabinowicz. *Product Engineering,* v. 29, Nov. 10, 1958, p. 84, 85.

Radioactive tracers, interference microscopy, high-speed computers in bearing and lubrication research. (X3q, X14, T7d, 1-54, 1-59; NM-h)

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STZ, Bohler Stahl, Schweizerischer Technischer Verband, Weinbergstr. 41, Zurich 23, Switzerland
Sumitomo Metals, Sumitomo Metal Industries, Ltd., 31, Kawaramachi 4-chome, Higashi-ku, Osaka, Japan
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SUBJECT INDEX

Since the annotations in this book are grouped into broad classes on the basis of process or property, the major emphasis in the index has been placed on materials, products and applications. Entries under the names of processes and properties usually refer only to general treatments of the subject. Wherever possible, items have been indexed under the name of the material or the type of material (metals, alloys, and metal forms) or product. For example, material on the rolling of aluminum appears as a subhead under the main entry "Aluminum alloys," and not under the main entry "Rolling." Similarly, material on the welding of steel plates in shipbuilding appears under the main entry, "Ships" rather than under the main entries "Welding" or "Steel plates." In general, subject entries conform to the usage in the "ASM-SLA Metallurgical Literature Classification," published by the American Society for Metals, 1950; Revised Edition, 1959.

Alloy systems in which one member is predominant are indexed under that member only. Where two or more members share predominance, entries have been made under each member.

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